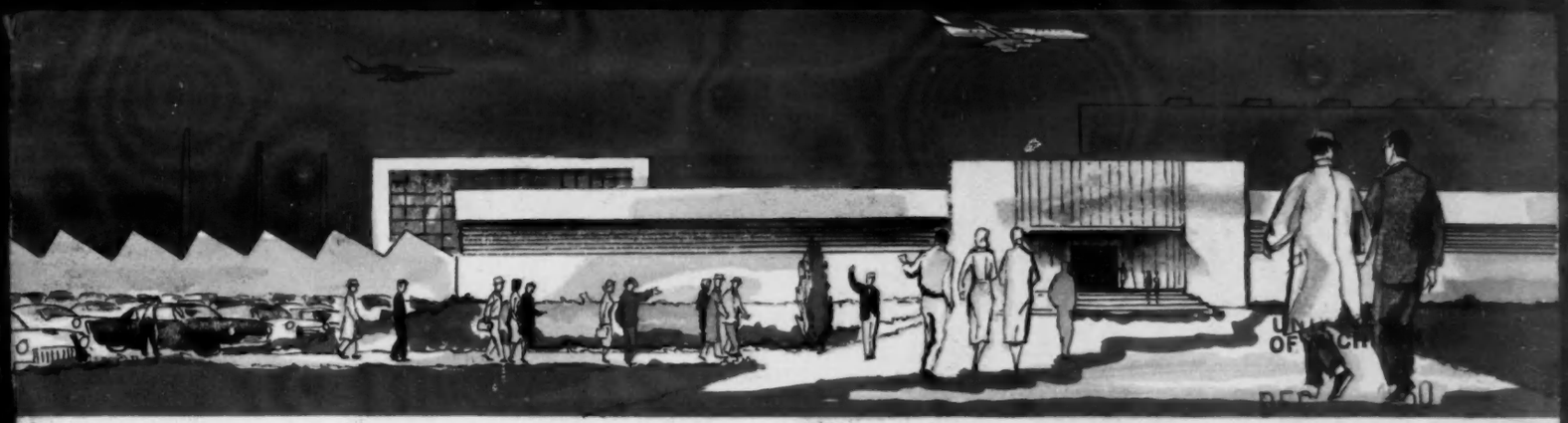

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The General Electric Defense Quarterly

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WILLIAM C. FOSTER
Senior V.P., Olin Mathieson Chemical Corp.

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President, General Electric Co.

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Pres., Aircraft Industries Assn.

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Dep. Chief of Staff, Materiel, Hdqs., USAF

GENERAL E. W. RAWLINGS
Comdr., USAF Air Materiel Command

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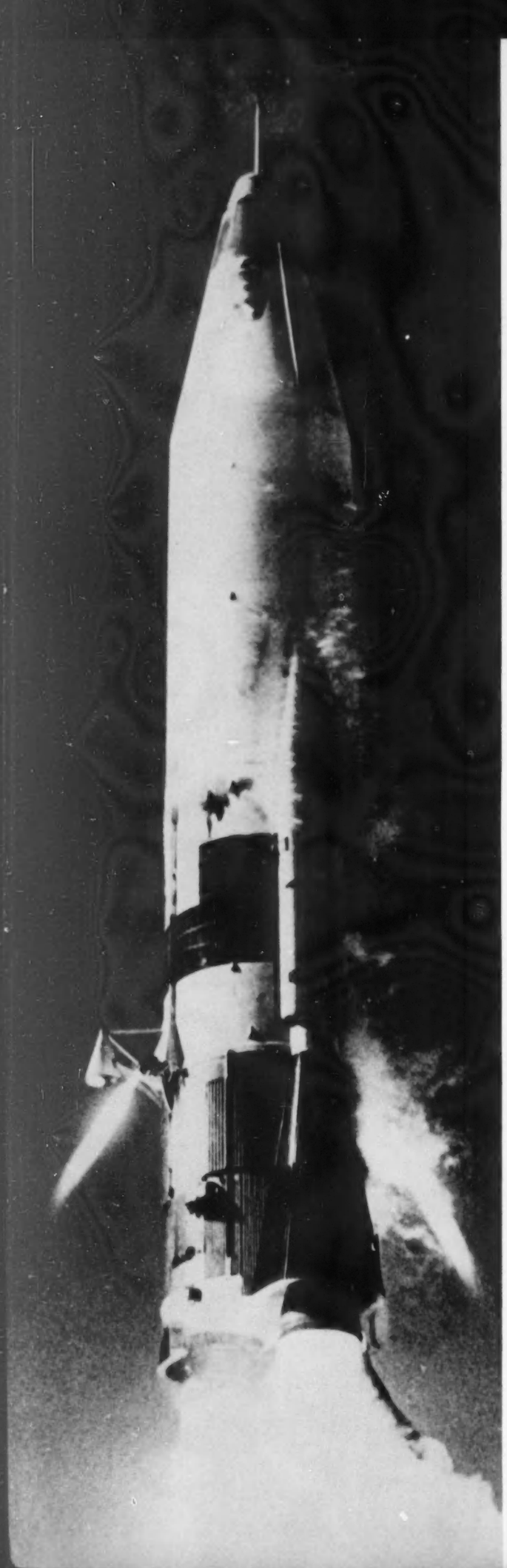

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THE GENERAL ELECTRIC DEFENSE QUARTERLY

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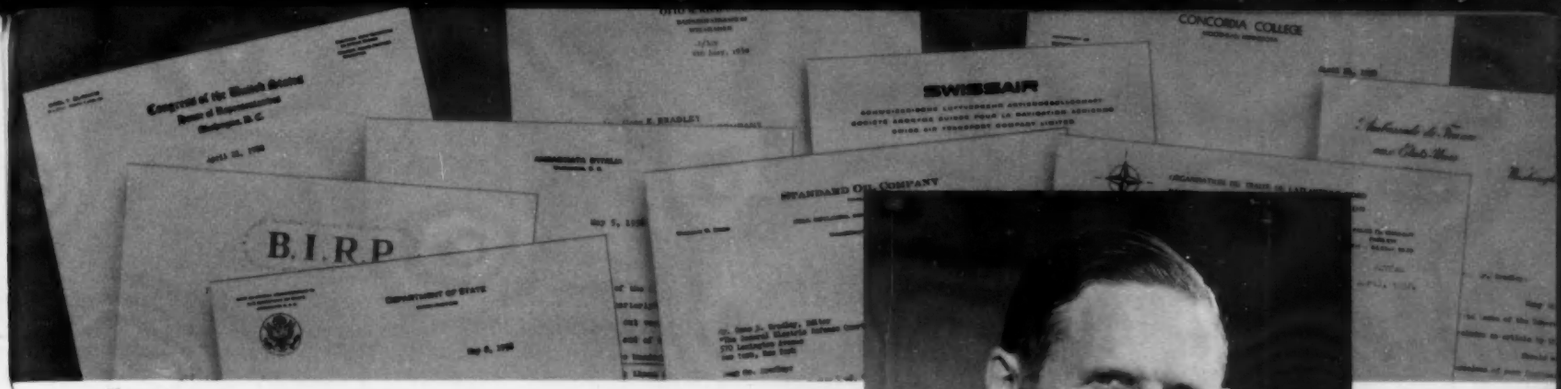

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U. S. Prosperity and Defense

Certainly all of us know that America *must* have adequate defense. But the question is, how to achieve it without 1) increasing defense spending to the point where we undermine our dynamic economy, and 2) adopting the very methods of dictatorship against which we are defending ourselves? In essence, how do we put defense on the most businesslike basis?

In this issue, seven men were asked to give answers—each because of his unique position and experience which enabled him to speak with authority on a specific segment of the total problem:

William C. Foster—industry executive, former Under Secretary of Commerce, E.C.A. Administrator, Deputy Secretary of Defense. Mr. Foster was asked to help put the broad picture in perspective, an assignment which he is eminently able to fullfill because of his diversified government-industry background. Even the USSR must acknowledge the weight of Mr. Foster's judgment. Note their alarm in the following quote from PRAVDA, written just after the Gaither Report went to the White House: "(he is) the leader of the whole group . . . (of) organizers of panic and war hysteria . . ."

Robert Paxton—Newly elected president of General Electric. Mr. Paxton has spent a lifetime studying ways to improve industrial productivity, and he sees the defense race in its proper perspective: a test of free world management vs. Communist dictatorship.

General Orval R. Cook—President of Aircraft Industries Association. General Cook, who entered aviation in World War I when planes flew at a top speed of 120 mph, todays observes operational aircraft that fly 1400 mph—and faster. He suggests how military-industrial teamwork can bring needed, swifter progress.

Gill Robb Wilson—Friend and counselor to hundreds of airmen, Mr. Wilson's life-long mission has been the inspiration of others. This powerful writer believes America's greatness can be preserved through more intelligent, non-partisan spending of air-power dollars.

For the *Defense Round-up*, we are especially pleased to have *Assistant Secretary Dudley C. Sharp, General E. W. Rawlings*, and *Lt. General C. S. Irvine*, the top three materiel executives of the U. S. Air Force. General Rawling's Air Materiel Command is the nation's largest single purchaser of goods and services, handling Air Force assets which exceed those of the five largest U. S. corporations combined. No men within the Air Force are better qualified to set down what it takes to achieve maximum defense at a reasonable cost.

The aim of the DEFENSE QUARTERLY is to encourage the exchange of authoritative ideas on this serious business of defense. We suggest that these pages constitute a continuing defense management forum. For example, we welcome response such as received from Admiral Jerauld Wright, who commented on our first NATO issue:

In reading the articles it seemed to me that despite the overall excellence of the coverage, there was one part of the NATO military picture conspicuously absent. I refer, of course, to the fundamental value of the North Atlantic Ocean to the survival of both Europe and North America. It seems to me that a comprehensive picture of NATO is incomplete without including the importance of the North Atlantic Ocean and the part it plays in uniting Europe and North America.

. . . I realize, of course, that free Europeans, when considering the threat to their freedom, look with anxious eyes towards the east. It is possibly understandable, but certainly unfortunate, that while so doing they fail to realize that they are being gravely endangered by the serious Soviet submarine threat to the West.

. . . Unless the nations of NATO completely dominate and have free use of the Atlantic seaway, I am sure you will agree that there can be no assurance of victory.

JERAULD WRIGHT
Admiral, USN
Supreme Allied Commander Atlantic

Our thanks to other readers who also took the time to contribute suggestions and comments on the NATO issue; and we shall look forward to your thoughts on: U. S. Prosperity and Defense.

C. W. LaPierre

C. W. LaPierre
Vice-president and Group Executive
Electronic, Atomic and Defense Systems Group
General Electric Company

An exclusive interview with William C. Foster,
Co-Chairman of the Gaither Committee,
and Senior Vice-president, Olin Mathieson Chemical Corporation

The Strategy of Peace-Fare

When the USSR's first Sputnik shocked the world into realizing just how great was the Soviet threat, a special report was being reviewed in Washington, describing what the U. S. need do to counter that threat. The co-author of the still-secret Gaither Report, now answers:

- What must be done to win the race for peace?
- What are our relative weaknesses and strengths?
- What strategy must we employ to win?
- How do we achieve success?

Mr. Foster, one broad introductory question, which may or may not be reflected in the Gaither Report: What is our underlying objective in the cold war?

- **Is it peaceable and workable coexistence?**
- **Is it ultimately to see the satellite nations freed?**
- **How do we know when we have won?**

In the first place, we have been all too prone simply to react to a military threat from our enemy. I don't conceive of that as our objective in this struggle. We stand for a peaceful, stable world because that is in our interest, as well as in the interest of uncommitted nations . . . and all mankind.

The cold war we have been forced into is certainly far preferable to any form of hot war, but I don't think it's the kind of life we want to lead. And coexistence, to me, means a compromise life. We can do better than that. With the widsom developed over these many years, we ought to be able to set forth our true objectives.

First, of course, we want to preserve our own freedom. This is our great and overriding objective. Second, we want to safeguard other free peoples throughout the world. And third, we want to teach, or by example show, the Communist nations that we can live together . . . and can do things to make life better for all peoples.

Today, we are forced still to position ourselves so that we can strive for these longer-range goals, and yet hold our position to keep from getting into a hot war under the threats and actions of the Soviet political leaders. We talk of cold war and hot war. I prefer to talk about peace-fare instead of warfare. To accomplish our objectives, a true peace-fare must be waged . . . and then the objectives can develop.

What would be the strategy of peace-fare?

For the foreseeable future, it requires that the potential aggressor—and we consider that to be the Soviet bloc—be prevented from winning any technological race. We must prevent him from winning clear-cut military superiority . . . from acquiring capability to spring a devastating surprise attack on this country . . . and from acquiring the strength to blackmail us. These are the primary elements in the strategy of peace-fare. Beyond these, we must give hope to new nations that they may attain a better standard of living. And we must convince our enemies that we intend no aggressive action against them or any other nation, but that we will defend ourselves against any threat to our freedom.

What is the nature and scope of the total threat facing the U.S. in its search for both peace and prosperity?

I believe the threat is five-fold: military, economic, ideological, subversive, and loss of technological superiority. Perhaps most important are the military, economic and technological threats.

How severe, Mr. Foster, is the military threat to U. S. security?

While security is only one of many problems which we have to solve as a nation, it is perhaps under present circumstances the most important. It may require heavier sacrifices than those we can afford from readily available income for an entire generation . . . and probably for two or three generations to come.

Security is the top level task to which we must devote our national effort. Other problems, how-

ever important, are subordinate to the overriding requirements of physical survival.

Could you give us specific examples of how the USSR is closing the gap militarily . . . and perhaps what we can do about it?

Yes, I can. Certainly, it is not our philosophy to attempt to equal the Russian strength in sheer numbers. At the end of World War II, we had a tremendous military force—one developed for fighting a specific war. We reduced that force as rapidly as we could, and placed our dependence on technological superiority.

The Russians, on the other hand, kept much of their military force in place after the war. They still retain a 4,000,000-man military establishment, trained and equipped in both nuclear and conventional warfare. Their industrial structure is directly geared to the production of material for this large force.

Russia today has a massive nuclear weapon supply structure. They have a surprisingly strong electronics industry. Their military back-up includes strong steel and machine tool industries, a strong aircraft industry, a strong missile industry. There are indications they have gone beyond us in the size of jet engines.

Russia has also put great emphasis on building up a strong submarine force and a defensive air force. Its growing long-range bombing force is capable of attacking our continent.

Regarding the economic threat, how and where do you feel the United States is being challenged and how serious is this challenge?

The challenge is indeed serious. Many analyses made of relative rates of growth of Soviet Gross National Product versus our own indicate that theirs has grown at a rate twice ours over the last 10 years. True, they start from a much lower base, but with this more rapid growth, they have today achieved a point where, as nearly as one can compare GNP of two dissimilar economies, theirs is almost 40% of ours.

The great threat, however, is that whereas only about 10% of our economic resources are devoted to military purposes, nearly 25% of Russia's resources are so devoted. Thus, out of an economy that is only about 40% of ours, they are able to match our total military effort. For this, of course, they pay a price . . . and the price is a lowering of the availability of goods for the enjoyment, happiness and welfare of the Russian people.

In the U.S., we are able to devote almost 90% of our resources to the welfare and progress of our people. Russia is able to devote only 75% of its resources to that end. The result is that Russians have improved their living conditions little even while their GNP has been growing rapidly.

How do you account for Soviet successes in the economic field?

Primarily, because they have determined that they were going to focus all of their resources on this narrower band of objectives including the military and heavy industry. This results in depriving their people of many of the good things in life. But the force and vigor with which they have pursued these plans has led to great progress toward their chosen ends. Russia provided itself with an organization both of government and of war-making machinery designed to yield maximum benefits in the international struggle.

Is it necessary for us to adopt this objective in order to defeat them? My answer to that: No! We do not have to abandon democracy, but we must realize that the Soviet State is designed to win the world struggle, while we and other nations of the free world have designed our system to give a better life to more people.

A serious challenge:

"... growth of Soviet GNP ... twice ours

Does this put the United States at a disadvantage?

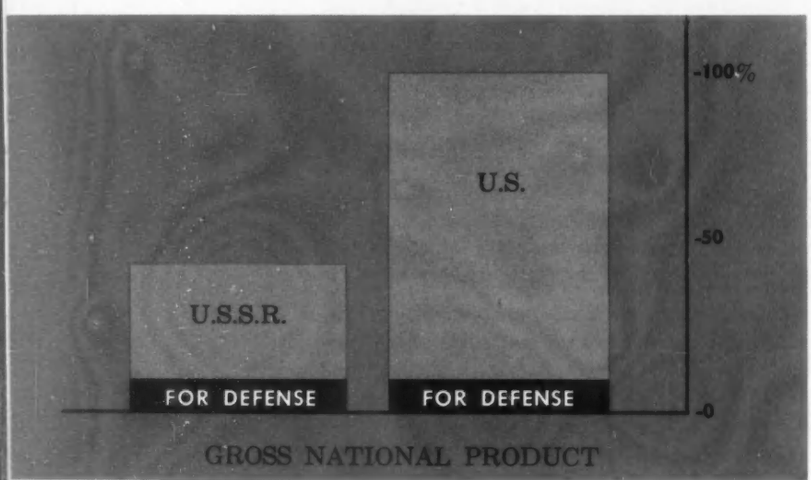
No, I don't think so. History proves that many of the great technological advances—key factors in modern warfare—were introduced by democratic societies. The reason: democratic societies gave full opportunity and made full provision for the utilization of individual, skillful, imaginative citizens. The opportunity of drawing on these millions of centers of initiative is something the Soviet system does not allow. This is where our great strength lies.

However, while we have the potential strength, it doesn't just spring from the democratic way of life. In order to transfer that potential into real power, and to make it truly effective, we must work and sacrifice. We must devote full energy of an understanding populace to our real objectives.

Moving to the technological threat—the third one which you identified—how well are we meeting it?

We have to meet it much better than we have. For example, Russia's progress in the highly technical field of electronics indicates a rate of improvement greater than ours.

Speaking of electronics, all of us who have been concerned with modern weapons systems realize that one of the great hopes the U. S. has for superiority is the contribution that has been made by our free competitive system in the development of new electronic equipment. Without this development progress, none of our ballistic missiles would be of value. In indicating the Russians have made great progress, again they made it from a lower base. We still, fortunately have a substantial lead. This is due to the great contribution of our free enterprise electronics industry.



In other technological fields, the way in which Russia has closed the gap since the end of World War II, commands attention. Perhaps the best way to indicate the situation is to quote the report of the Senate Preparedness Subcommittee, chaired by Senator Lyndon Johnson: "On the basis of sworn testimony by top scientists, leading industrialists and government and military officials, it can now be said:

"One, the Soviet Union leads the United States in the development of ballistic missiles.

"Two, the Soviet Union leads the United States in number of submarines, which raises the possibility of attack with modern weapons or missiles, although the indications are that we are ahead in the production of atomic submarines.

"Three, the Soviet Union is rapidly closing the gap in manned airpower and, at present rates, will surpass this country in comparatively short time.

"Four, the Soviet Union has a system which enables it to develop new weapons in substantially less time than the United States.

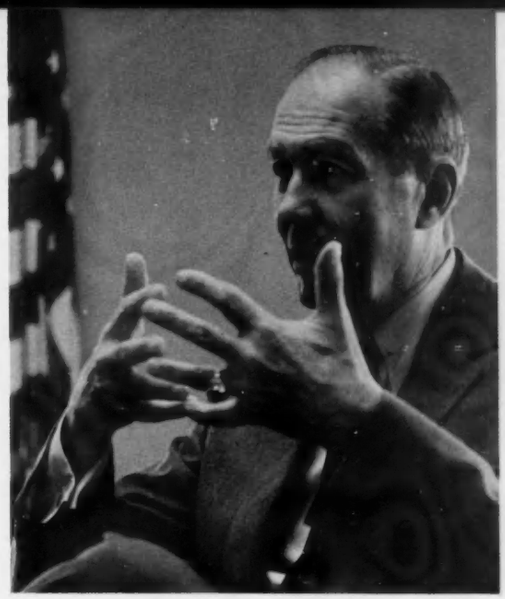
"Five, the Soviet Union has led the world into outer space.

"Six, the Soviet Union is producing scientists and technicians at a rate substantially greater than our country."

As we are now proceeding, Mr. Foster, can we meet the total threat, or will we fall short unless certain specific corrections are made in our thinking and in our strategy, in our management methods and organizations?

This is the basic point that most concerns me. Should the relative rates of progress continue, Soviet Russia could—before too long—surpass us in many important fields. With their rate of economic progress twice ours, it is mathemati-

over the last ten years."



cally obvious that within X years they will equal us at least.

Their progress in technological fields where we thought them much less adequate than we, indicates that we have a big job.

Unless we are able to put more energy and more good management into technological progress—and have more freedom for the contributions which grow out of the genius of American private industry—we will be in bad shape.

Do you consider it possible on a continuing basis to achieve both sound prosperity and strong defense?

I certainly do. People have said that if we put too great a proportion of our resources into defense, we would destroy our economic strength —the foundation for overall strength. I concede that this would be possible. However, history best indicates what we can stand without such destruction.

During World War II, we spent about 43% of GNP in military activities. It put a terrific strain on our economy, but we were able to endure it.

There was a period during the Korean conflict when we spent about 14% of GNP for military purposes. During that time, it is quite clear that we were able to maintain a strong economy.

Our great inherent advantage is the presence of a massive industrial structure which can, if we choose, be geared to support a larger and more versatile military establishment than can all the industrial facilities of the USSR.

We are presently matching the economic resources which the Soviet is devoting to the military. While we are using about 10% of GNP, Russia is using 25%. If we devoted another 10% of our total resources—still leaving 80% for consumer goods, services, and all our present high standards of living—the Russians, to match us, would have to take away from their people one-third of the already sparse good things of life they have. This is because their GNP is now only about 40% of ours, and even after ten years of their estimated factor rate of growth, they still would have only one-half of our GNP.

We have deep reserves in both material and human resources. We have the largest industrial plant and the most productive labor force in the world. We can maintain a substantial military effort for many years, greater than we have for the last few years . . . and we can do it while still having a growing economic strength available for other purposes. It is sometimes forgotten that contributions to military activities, particularly those in research and development, have a substantial value for commercial products.

We talk in terms of calculated risks. Why is this necessary? If the threat is so great and if we have the capacity to exceed our present economic commitments, why do we need to take any calculated risks at all? Why not simply go out and buy the protection we need?

What I have been saying about our ability to meet these costs does not mean that we can meet every cost that the fertile mind of man can dream up in the way of new products. With developments in technology there is a multiplying factor that makes selection more difficult.

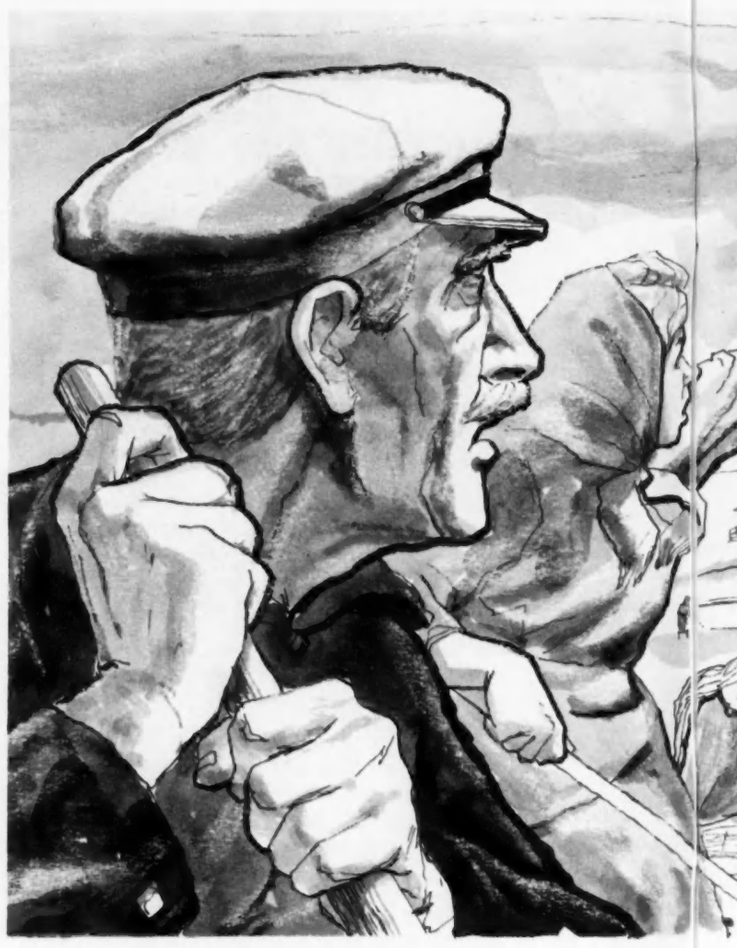
To quote some rough figures: In World War I, the choice among weapon systems was limited to some 30 systems. In World War II, there were 300 from which to choose. By the Korean War, we had to select from among 500 or 600. And today, in view of fertility of invention and development, we may have to select a weapons system from 1200 to 1500 . . . and each of today's systems is a more expensive system than the earlier ones.

It is clear that if we attempt to push down all these paths, we might dilute our resources—both economic and human—so that we could overwhelm ourselves with the cost. This leads to a needed emphasis on methods of selection. It also makes clear the fact that we cannot afford to buy our way into a position of strength and safety.

You would say then that defense buying is certainly far removed from being a military WPA or make-work.

It certainly is. This is a strong reason for the reorganization plan which the President has put before the Congress. The massive nature of our

"... the Soviet State is designed to win the world struggle, while we ... have designed our system to give a better life to more people."



military operation makes it absolutely essential that the organization be brought up-to-date to meet the changing art of warfare.

With proper management and streamlined organizations, how much less expensively could weapon systems be developed and produced? How much could lead-time be cut?

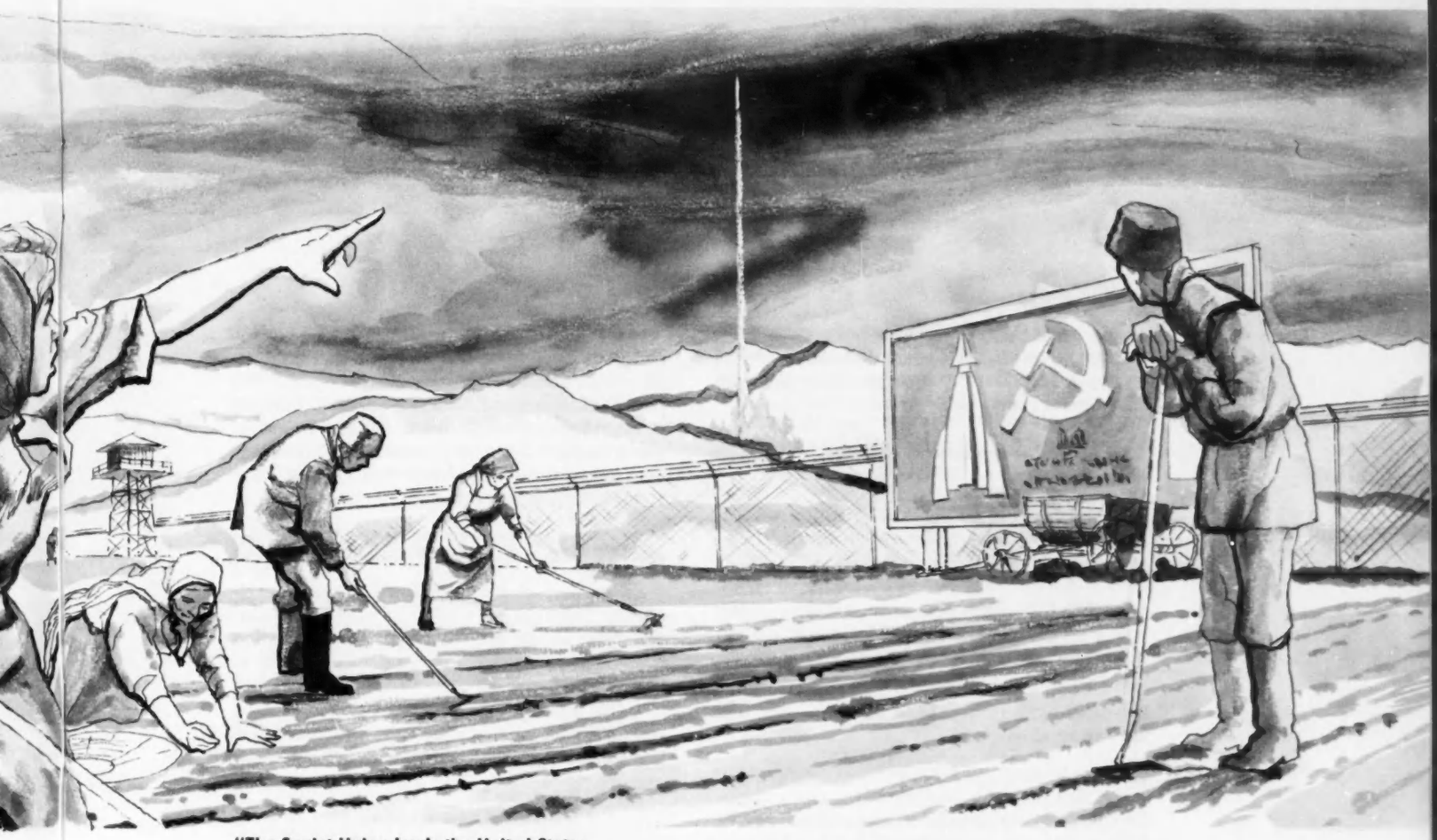
That is a difficult question to answer in specific terms. It is certain that with improvements referred to and the enormous size of the spending programs which we have to have to develop missiles, we will be able to identify more rapidly those systems which are productive . . . and eliminate those which do not promise the same benefits.

We have set up in the last few years, based on electronic devices, a number of modern system analyses which management uses both in private business and in government. We have ways to run through enormous numbers of computations in minute periods of time. This allows us to compare the benefits of particular programs. Since it is now available in military planning, this will provide the basis for decisions to allow the abandonment of less fruitful systems, saving perhaps billions of dollars. The ability to use these systems is a product of better organization.

It is essential we utilize new procedures. Some of our weapons systems take from seven to ten years from conception to operational availability. Unfortunately, Russia has worked out systems whereby they are able to do this same thing in about one-half the time. We must, therefore, use improved procedures in order not to be faced with the threat of better weapons in their hands. It is obvious if we take twice as long, we will be in the position which has been publicly stated, by Mr. Quarles, "By the time a new weapon system becomes operational, it is already obsolete."

You have spoken of the responsibility that rests on private industry. How can industry's contributions be made more effective?

Having been on both sides of this fence—in



"The Soviet Union leads the United States in the development of ballistic missiles"—REPORT OF THE SENATE PREPAREDNESS SUBCOMMITTEE

government and in private industry—it seems to me that many of the procedures which have been developed for utilizing private industry, instead of being developed to take advantage of its great ability, have been designed to limit its contribution. For example, procedures have become restrictive, specifications tight, and the freedom to make suggestions and to utilize the initiative of private industry has been reduced.

This is perhaps natural as the activities of government and business become more closely integrated with the shrinking size of the world and the pressures of international and domestic policies. But it seems absolutely essential that we take advantage of the abilities of free, competitive private enterprise—to look ahead, to create new ideas, to accept risks in development. Progress is our best protection. And progress is not enhanced by too detailed instructions and restrictions imposed on manufacture and development of new products and new procedures.

Do you think that industry is being given adequate incentive to achieve the progress you state is necessary?

Certainly not in the technological field. Business must have the hope of rewards in the form of profit. This is what provides the strength of business. This is the nature and basis of our whole economy. There has appeared to be, particularly in the research and development field, an attempt to get something for nothing.

In R&D, business has to put a disproportionate number of its best men on the task of developing new products and meeting new objectives of our military services. Sometimes this is done on a "no fee" research and development contract. And when the finding has been made, the production contract is given to another company. Perhaps there is a way to maintain the pressures of competition in production, and still retain the interest of a private company in doing the R&D. Perhaps a royalty could be given to the developing company, even though it is unsuccessful in obtaining the production contract.

"If we become weak, it is obvious our enemy will have the

Government cannot expect the best results unless it gives incentives for the greatest application of energy and skill to companies which it brings into research and development activities.

What can private companies on their own do to increase effectiveness of contributions?

Many things. I'm close, of course, to the things my own company, Olin Mathieson Chemical Corporation, has done. We have been active indeed in many new fields, particularly in metallurgy and chemistry.

We have assigned a number of our best people to such fields as nuclear energy, ballistics, propellants and chemicals—in which it had been indicated by the government that there is a need for new products.

Over the years, we have assigned a great many of our best people to the field of high energy fuels. Not only have we done it by using our own people, but we have, in a way which I think business generally has found wise, enlisted the services of universities on basic research where we felt it important to support and enrich our own thinking.

Then we have found contributions could be made by small business subcontractors, both in the early development stages and in the later production items. Many times, a small company possesses brilliant people at the top who would not otherwise be available in developing these things for the government, since the government normally has programs too large for these small companies to undertake.

Business, in its search for ways to make new profits, uncovers completely new products which are useful for commercial production . . . and later prove to be equally valuable, or sometimes more valuable, to new products which the military can use.

Can you give an example of one of these products?

We recently developed in the Winchester Western Division of our Company what we think is a new principle of absorbing shock. Though we developed the new principle—absorbing shock in Fiberglas—to increase the economy of a tool, we found that it offered a new way of absorbing shocks of all sorts: landing gear, recoil mechanisms, metal springs—in a way that no one up to this point had discovered. And the development was done completely at our own expense for a commercial purpose.

Is the field of private investment an area in which free enterprise companies can make a substantial contribution?

I assume your question refers to military development. Private companies have made a contribution, but perhaps they should not have had to make it in quite the way they did. We have had instances where, due to delays in getting financial support for a new plant from the government, we have made the investment ourselves to keep up with the schedule we felt essential.

For instance, we made our own investment in a high energy fuels plant to the sum of $5\frac{1}{2}$ million. This saved about two years in the time that it would have taken government to approve.

This risk we took because of our belief that the product was essential. However, government cannot depend on business always taking such unusual risks. When a product has been strongly recommended both by military people and by the manufacturer, facilities approvals for these particularly vital new products should have early and flexible support by Congress to back up both the Department of Defense and private business. All too few companies have the ability to undertake this sort of financing, particularly with the limits put on profits under present procedures.

I would agree that where it can be obtained, as we did it, perhaps it is good business for the government. But, with the risk of rapid change and obsolescence, only adequate incentives can consistently encourage industry to take the risks that promise new products. Business must have consistent profits to survive. Government has been too conservative in its willingness to do this. Perhaps, this is one of the reasons that the Russians have moved faster than we.

power to divorce us from our friends . . .”

Certainly those of us in business are willing, with reasonable opportunity for profit, to risk our money in bricks and mortar, as well as in carrying payrolls and development costs. However, government must at least be consistent in its contracts over a long enough period to make this risk consistent with the obligation of boards of directors of companies to their stockholders.

What can the nation at large do to help speed economic progress?

There is a real need for public understanding and support of consistently maintained programs of the nature we have been talking about. The sort of effort we have discussed is one that will require some sacrifices, and will have to be maintained over a long period of time.

One of our national failings is that our military efforts have complete support during emergency conditions, and then as a nation, we seem to want to be completely out of the business immediately thereafter.

In the kind of world situation we have, we must maintain strength because only through constant maintenance of this strength will we be able to move toward our objectives. We must deal from strength. If we become weak, it is obvious our enemy will have the power to divorce us from our friends and then blackmail us or even destroy us.

Public understanding, of course, will only grow out of clear and continuing statements by our national leaders as to the situation. This is a direct and urgent responsibility of the administration and of Congress.

In addition to this public education—out of which I feel sure will come public support—management of business has the responsibility of being willing to cooperate with government in necessary programs where particular businesses are best qualified to serve. Naturally, business will expect profit, because only through profit does business remain healthy and grow. Business management thus will be encouraged to devote itself to the sometimes more difficult problems of cooperating and meeting government requirements.

Labor leaders and labor unions too, have a direct responsibility in this field. They have the responsibility of helping to increase productivity, of supporting management in its efforts toward prompt and high-quality supply of products needed by government. We need to eliminate feather-bedding practices in which men are under-employed through restrictions in contracts, with too many people specified to do the particular job at hand. Labor unions need to eliminate corrupt practices and leadership recently exposed. I am glad to see that Mr. George Meany and other leaders have said that they will be stamped out.

One final point, Mr. Foster. In a recent address, you are quoted as saying, "We, not the new classes of Communism, are the true revolutionaries and the protagonists of the new dignity of man." Would you care to comment on the phrase, "true revolutionaries".

We *are* the true revolutionaries. I have said this in many countries. We are revolutionaries in the sense that we believe individuals are entitled to an opportunity for the pursuit of happiness and for the development of the best that is in them.

We have stood for revolution in the sense that we believe what mankind can achieve should be limited only by his own willingness to work and to think and to do. Our form of government and our form of development has been based on attempting to provide that opportunity.

Our enemies, and unfortunately too much of the rest of the world—certainly the older civilizations—have not allowed the same opportunity for people by their own efforts to grow and to enjoy life. Our introduction of this philosophy into political life and our achievement of this kind of a life demonstrates the power of this revolutionary thought, and that we are the true revolutionaries.

Recently elected President of the General Electric Company, Robert Paxton has long been a forthright spokesman for industry. In answer to one of the worst canards circulated about industry—the notion that industry seeks men who are blind conformists—he has publicly said, ". . . encouraging men to think independently and to stand up for their convictions is essential to . . . progress." Drawing on 35 years' experience with General Electric, Mr. Paxton writes with authority on the development and production problems of heavy industry.

Born in Edinburgh, Scotland, Mr. Paxton was brought to the U. S. as a child, and raised in Troy, N. Y.

Toward Security With

by Robert Paxton, President, General Electric Company

With the nation's prosperity and defense program mutually dependent on one another, it is a primary responsibility of both government and industry to maintain a vigorous and expanding economy. Mr. Paxton defines industry's task in supplying more efficient management, government's role in providing a political and economic climate for growth.

The people of the United States and the other free nations are once again confronted by a question that has recurred throughout history: Can a democracy effectively meet the challenge of a dictatorship while still respecting the traditional freedoms of its people? Twice within our time this question has been answered vigorously in the affirmative, yet in recent months it has been revived with increasing frequency—and evident doubts as to the answer.

The challenge of today differs from others in this century in that it lacks the more dramatic appeal to patriotism and individual sacrifice and effort that a "hot war" possesses. It is economic as well as military, intellectual and spiritual as well as political. The duration of the challenge, too, will be greater and call for a long, sustained effort rather than a "crash" mobilization. President Eisenhower suggested, early in his first term, that we may have to maintain strong defenses in a "cold war" of as long as 40 years. And recent Communist adventures throughout the world give us little reason to doubt the accuracy of that forecast.

To meet this test of our form of society we must first clarify our own aims. What, realistically, are the objectives we seek in undertaking this struggle? What are our goals in both the economic and the military-political spheres, at home and abroad? We must maintain a balance between our objectives lest an imbalance create the very weaknesses and "contradictions" in our system for which the Communists wait and plan. In a free society we cannot increase our military expenditures regardless of consumers' needs and desires for an even higher standard of living. Such a course is open to those who control a directed society—whether Hitler in Germany, or Khrushchev in the U.S.S.R.—but all our traditions are against it. For us to adopt this course would be a counsel of despair and would impair—and in the long run, undermine—the freedom which is the great strength, as well as the great responsibility, of our society.

Making Resources Count

Within the framework of our established goals and alloted national security budget, we must strive to make every resource count to the utmost; we must work toward "security with solvency." In a very real sense the struggle boils down to a test of free world management (and I speak here not only of industry, but of the whole government-science-industry team) versus Communist dictatorship.

This issue of The General Electric Defense Quarterly seeks to explore some of the relationships between our country's prosperity and its defense program. That they are mutually dependent on one another cannot be doubted. Without a strong defense posture our prosperity would be vulnerable to attack from outside: without the basis of a sound economy our defense program would crumble from within. Not only does a prosperous and efficient economy enable us—through its wealth, accumulated technology and broad production base—to strengthen and modernize our weapons systems, but it also provides the direct answer to the Communist economic challenge. Barbara Ward, the writer and economist, has observed that ". . . the material aim of the Communist world revolution is to achieve the American way of life,"

and the present Soviet leaders have set their sights on surpassing American standards of production and consumption in the next decade. On both counts, then, a primary responsibility of both government and industry to our over-all defense is to maintain a vigorous and expanding economy—the former, by providing the political and economic climate for growth; the latter, by efficient management of our resources, by continuous research into new products and new methods, and by long-range planning to meet the needs of our growing population.

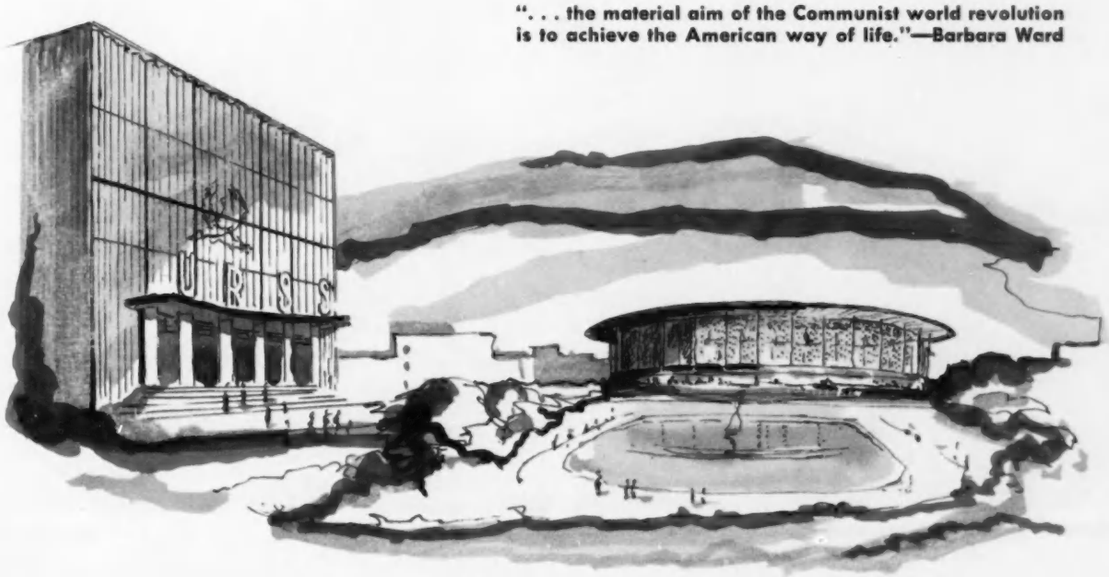
h Solvency

Twin Task: Defense and Economy

Let us dispose, once and for all, of the notion that defense expenditures are a necessary prop for prosperity. Abrupt changes in the programming of these expenditures undoubtedly have had their impact on the course of the economy, as experience in the last twelve months has demonstrated. But this is a far cry from proving that we cannot have prosperity without a strong injection of defense expenditures. On the contrary, every resource devoted to our national security must be taken out of our total national product. The dollars that must be spent on defense, mutual security, veterans' programs, and interest on the national debt (largely a product of past defense) might otherwise have gone to building up the nation's capital structure and improving the people's levels of living. These dollars are inherently inflationary to the extent that they add to business' and individuals' purchasing power without adding to the total production of goods and services on which this purchasing power can be spent. Defense expenditures are the necessary price we must pay to maintain peace and prosperity, but we must ensure that this diversion of resources from productive purposes is kept to the minimum consistent with national security.

The twin tasks of ensuring that the defense programs do not undermine the soundness of the economy upon which they depend and of obtaining full value from the taxpayers' investment in these programs present a formidable exercise in management to the whole defense team. The sheer size of our national security operations—upwards of $46 billion for the fiscal year 1959*—raises problems of planning and control far beyond those of even our largest private companies. The changing emphasis from mass production to research and development

". . . the material aim of the Communist world revolution is to achieve the American way of life."—Barbara Ward



"In a very real sense, the struggle boils down to a test of free world management

in our armaments production calls for greater imagination and scientific knowledge, greater willingness to take those risks from which alone major technological breakthroughs can result, greater flexibility in following up each new advance. Not only is the cost and complexity of weapons systems increasing in geometric progression, but—as William C.Foster so graphically points out in his article—the number of different systems from which we must make our selection has risen at a startling rate.

One of my former associates, Dr. Zay Jeffries, once remarked about the complexities of our industrial civilization:

> "Our progress depends to a considerable extent on seeing to it that the simplifying processes move forward in approximate balance with the complicating processes. If this can be accomplished, then individuals with given ability can expect to go forward indefinitely without becoming casualties of their own complexities."

Pinpointing Defense Responsibility

The complexities of modern defense—problems of technology, economics, strategy, geo-politics—need no further amplification for purposes of this article. To avoid becoming casualties of them, we must indeed simplify our organization and our methods wherever possible. It must be acknowledged that, for instance, military considerations sometimes make economy a secondary factor, or that there is little the defense team can do to unravel the tangled skein of international relations. But it will help if we bring sound management principles of planning, organizing, integrating and measuring to our development, procurement, and production programs. It is not that we need more "czars," but that we need to pinpoint responsibility—and authority—for specific duties on members of the present organization, whether in the Defense Department, the branches of the Armed Services, or industry. Other contributors to this issue have spelled out some of the ways in which we can simplify—and economize—by improved management and greater use of incentives for quality performance.

While many of the initial steps toward the most efficient use of the defense dollar must be taken by government, either alone or in conjunction with industry, there is still much that industry can do on its own. In defense, as in commercial production, we must eliminate road blocks to higher productivity. It is extremely disturbing that our national productivity has leveled off at the very time an increase is most needed to meet the new world challenges.

U. S. Productivity Below Potential

It has been estimated that, regardless of the temporary effect of a recession, our level of productivity is as much as 20% below its present potential. With no more facilities, no more workers, and no longer hours, we should be able

* Including expenditures for direct defense programs; atomic energy; and military assistance and defense support for other countries.

"We must be alert to the possibilities of applying ideas and processes developed in commercial business

Military research is speeding the arrival of turbine-powered helicopters for America's air travellers.

Amplidyne generator for originally developed

. . . versus Communist dictatorship."

to add to our gross national product goods and services worth over $80 billion—just about the total the Federal government spent for *all* purposes in 1957. Clearly, this would be a most desirable goal to achieve: on our progress toward it depends our ability to have both the higher level of defense our country requires and the higher level of living its citizens desire.

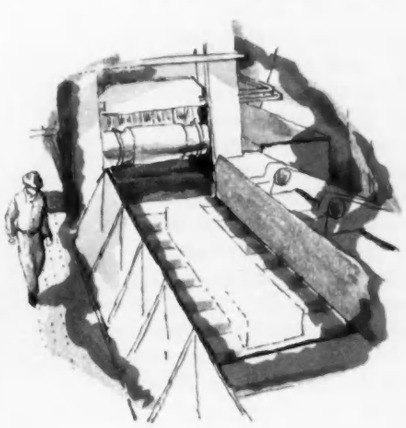
Working for this goal means the elimination of needless waste and costly "feather-bedding." It means greater cooperation between labor and management in introducing and taking full advantage of every technological advance. It means greater public understanding of the fact that higher pay, unmatched by more goods produced for civilian use, does nothing to raise the level of living but only contributes to further inflation. It means more purposeful, more efficient and more imaginative work from everyone employed in defense or civilian production and service. It is scarcely an exaggeration to say that, in this sense, a change in attitude alone can make unnecessary for us (at least, in any situation short of war) the choice between "guns and butter." We can have both.

Some of these steps and these attitudes we in General Electric are realizing in our current program, known as "Operation Upturn," to accelerate the upturn from the business recession by bringing extra values and renewed confidence to customers. This is not simply a sales promotional effort, but a sustained Company-wide program, embracing *every* function of our business, focused on bringing improved service and improved values to *all* our customers. It demands improvement of product design and performance by our engineers; increased productivity and reduced production cycles from our manufacturing personnel; more accurate anticipation of our customers' wants and better product service from our marketing force. These and other efforts that are being asked of our employees will be applied to our defense business and to our commercial production.

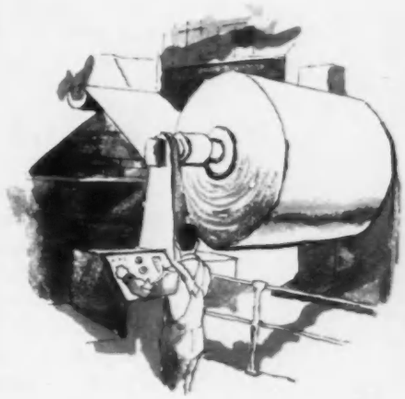
Qualitative—Not Quantitative—Superiority

The free world's margin of superiority in military strength over the Communist countries must be qualitative, not quantitative, for we cannot hope to match the massed manpower of Russia, China and the satellites. Industry must supply the most advanced weapons, of the highest standards of performance, that our technology allows: the armed services must provide men with the skills and training to use these weapons. Some idea of the super-quality workmanship that must be built into our modern weapons systems can be gained from an illustration used by Lt. General S. E. Anderson, commander of USAF's Air Research and Development Command. Citing the example of a comparatively simple missile composed of 500 individual components, he points out that each component must have a reliability of 999 in 1000 to enable the complete missile to be fired successfully 50% of the time.

to our defense needs . . . and results of military R & D to new products in the civilian economy."



World War II B-29 was for steel industry.



Thyratron tubes, used in B-36 armament, were developed from industrial electronic tubes.

"... we must eliminate roadblocks to higher productivity."

This typifies the challenge to industry's designers, engineers, technicians and workmen.

Industry is in a unique position to make a vital contribution toward increased efficiency and economy in defense by speeding the cross-fertilization of ideas between military and industrial technology. We must be alert to the possibilities of applying the ideas and processes developed in commercial business to our defense needs. Equally, the results of our military research should hasten the progress of new product development in the civilian economy. In this way we can avoid the extravagances of duplication, and obtain the greatest value from the resources we devote to defense.

Defense Development Benefits Consumer

There are many familiar examples of development, that would ordinarily cover many years, being compressed by the urgency of defense work into much shorter periods—to the ultimate benefit of the economy as whole. The most spectacular of all is the harnessing of atomic energy which is now being developed by industry for peacetime purposes. Military requirements speeded up the development of jet engines, which are opening up a new vista in commercial transportation. The turbo-supercharger, first developed by General Electric in 1917-18, later became the basis for the Company's entry into the jet engine field. Now a version of our J79 engine is being produced for commercial use as the CJ-805, and will power the Convair 880 jetliner; Pratt & Whitney's J57 will be used in the Douglas DC-8 and Boeing 707; Allison's T56 Turboprop in the Lockheed Electra. Radar, electronic computers, transistors, magnetic amplifiers, and printed circuits have all been developed more swiftly or improved greatly under the stimulus of defense.

Less well known are the examples of the reverse process of commercial research aiding military technology. During World War II the B-29 used an amplidyne generator originally developed for the steel industry. Thyratron tubes, very important in the B-36 armament, were developed from industrial electronic tubes used in the paper and resistance welding industries. The automation principles and processes that have raised productivity in the automobile, communications and other industries give promise of important cost reductions in certain sectors of defense production.

Industry's New Role In Defense

Companies' organization should reflect the changed circumstances of defense. Historically, industry participation in military activities has been to help win a war already started; today industry participation is to help prevent a war. Since—as we have already noted—defense policy and programs must now be on a "long-pull" basis, we must learn, as a nation and as individual companies, to conduct defense as a business and not as an interruption of business. The "balanced corporation" concept is the key to General Electric's defense-commercial structure. One of the Company's three major groups—the Electronic, Atomic and Defense Systems Group—is specifically concerned with matters of defense and makes the Company's principal defense contribution. It integrates the special skills, knowledge and facilities required, and avoids dislocation of the purely commercial operations of the Company. It simplifies liaison with the government and its contact representatives, and places decision making where it belongs—close enough to the problem to provide solutions born of understanding.

As the problems of incentives and dependable financing of defense (mentioned elsewhere in this issue) are ironed out, industry should consider investing more of its own money, manpower talents, and facilities in defense activities. Already a start has been made. General Electric's share owners have invested several hundred million dollars in this area of the Company's operations. With such private investments, a substantial portion of the defense outlay—that for capital additions—can be lifted from the taxpayer, and the investing company has greater incentive than ever to achieve results that enhance the national defense.

Importance Of Public Support

Above all, however, industry must play its part, along with other members of the defense team, in winning and holding public support for the new requirements of our nation's defense. Only if the electorate, and their representatives in Congress, recognize the need for continuity in defense programs, for greater use of incentives, for closer industry-armed services cooperation, can we establish the climate in which the most effective management of our defense system can flourish.

An active pilot for more than 40 years, General Orval R. Cook retired from the Air Force two years ago. He accepted the Presidency of the Aircraft Industries Association in January, 1957.

In the years between his graduation from the U. S. Military Academy and his retirement, General Cook accumulated extensive experience in aircraft procurement and production, supply and maintenance, and industrial planning. Thus, in his analysis of aircraft industry problems and opportunities, General Cook is able to speak from both sides of the military-industry defense team.

He holds the Distinguished Service Medal and the Legion Of Merit.

For The Aviation Industry:

A New Role in U. S. Economy

by General Orval R. Cook, President, Aircraft Industries Association

Once known as a "war baby", the aviation industry today:

- **Has the single largest demand for capital.**
- **Is burdened with almost unbelievable complexities which have accompanied the transition to multi-Mach aircraft and missiles.**
- **Its knottiest problems arise from complicated relationships with the military services.**
- **Needs measures to protect design originators.**
- **Proposes changes in the Renegotiation Act of World War II.**

Once again, the American aircraft industry is going through a transition. Unlike all the others, which have been violent reactions to a boom-and-bust existence, this one derives from an increase in responsibility brought about by vast changes in science and technology, and is relatively gradual in nature. To this may be added the widening effects of its operations and products on almost every aspect of modern life.

Call it evolution or revolution, as you will, the progress of this industry in building weaponry and transportation has been so rapid that we have literally "gone through the roof" into outer space. The sound barrier, which seemed so forbidding a decade ago, has become simply a plus-or-minus factor in measurement of speed. Today, orbital velocities of 18,000 miles per hour are visible fact. Target for next year is man in space, and then the planets—the moon, Venus, Mars—and far-seeing eyes are looking even beyond.

Meanwhile, our new turbo-jet airliners will continue to shrink the world further, in terms of mass air travel and movement of goods.

We have neither time nor space here to review the fantastic momentum of research and development which has brought such things about in a watch-tick of history. Nor have we time to speculate on the spectacular aspects of soaring around beyond gravity. The purpose in this brief article is to discuss present and future developments as they affect the aircraft industry and the nation.

Second Largest Industry In U.S.

Today, this industry is one of the two largest in the country. Its basic manufacturing structure alone employs around 765,000 people. It will be the principal recipient of some $10.4 billion which the military services will spend for aircraft and missiles and related equipment in fiscal 1959. It will make a start this year to pour out its $3 billion backlog of orders for jet and propjet transports as the Jet Age of air travel begins its intensive

phases. It will largely increase its sale of private planes and commercial helicopters. It will export over a billion dollars worth of its civil and military products to foreign markets.

More than this, the aircraft industry has extended its roots into almost the entire United States industrial economy. It leans heavily on more than 30,000 subcontractors and suppliers in every state of the union. Of its total procurement dollars, 55 percent goes into subcontracting and supply, and of this, 40 percent goes to so-called small businesses, those employing fewer than 500 people. It is having major impact on banking, transportation, construction, retail sales and almost all other business, as well as on education and state and local support through taxes.

Largest Single Demand For Capital

For the first time in history, the aeronautical industry (embracing aircraft, airline and related groupings) vies with the automotive and steel industries as the key to the over-all business trend of the country. In a recent article of the Harvard Business Review, it is pointed out that aviation now has the largest single demand for capital.

This is an unaccustomed role for the aircraft industry. It has always been affected by the national economy, but this is the first time it has been recognized as affecting the economy in major degree. So entwined has it become with other industry, other business and with the welfare and support of millions of people that its strength and stability has significance far beyond its more vital role of helping to assure the national safety.

Always in the past, the aircraft industry has been known as a "war baby", and not without reason. Twice it has surged to the heights in world wars to perform miracles of development and production. Twice it has been floored with wholesale post-war contract cancellations, but each time it has rebuilt patiently and steadily. Even now, in the present cold war, it is significant that over 85 per cent of its contracts are for military equipment.

Defense Is Fourth Necessity of Life

But things are different today, for three different reasons. In the first place, it must be accepted that, whether we like it or not, a fourth necessity of life has long since been added to the three we have always known—food, shelter and clothing. This necessity is defense, and it must remain with us as long as there exists in the world a basic and powerful political philosophy which calls for destruction of free nations. As President Eisenhower said in 1952, "we are living in an Age of Peril, rather than a moment of danger." Wars can be conclusive in days, perhaps hours; we dare not be inferior. In the second place, civil air transportation has grown and stabilized until it has far outstripped rail and water transportation in passenger movement, and this market will continue to grow. And in the third place, the aircraft and missile manufacturers have invested much more importantly in their own businesses than ever before, through equity capital and borrowings and through the highest rate of reinvestment of earnings of any other industry—around 65 per cent.

For these reasons, it seems highly unlikely that there can be any repetition of those abrupt and devastating readjustments which followed the two world wars.

On the defense side, the task facing the aircraft industry is enormous. Much of the transition which is taking place is due, of course, to the unbelievable complexities which characterize today's multi-mach aircraft and missiles and the surge of man and his trappings beyond what have been considered their natural elements and confines. The fantastic new power of rocketry, the wizardry of electronics, the demands on metallurgy, chemistry and the other physical sciences have brought great changes in emphasis. The base of the industry is broadening rapidly, not in its old familiar role as a high-quantity producer of military units, but in the production of ideas and weaponry of such devastating potential that mass production is not necessary. At any given time, henceforth, they must always be the best, for once war begins, we must fight with weapons built before the first overt act.

New Companies To Solve New Demands

Not only have the old-line aircraft manufacturers extended their functions through new divisions of electronics, rocket power and space and astronautics, but many new and aggressive companies in these fields have been spawned by these demands, especially in electronics. The problem of weapons and space systems management, centered largely in the aircraft industry, has been complicated to a very great degree.

One of the most profound effects on the aircraft industry has been the increased emphasis on guided missiles. Where, in 1954, the armed services spent 90 percent of their funds for manned aircraft, and 10 percent for missiles, today around 35 percent of the funds go to missiles. There are predictions that the percentage will go even higher.

Of the 40 announced missile projects now in various stages of development and production, the old-line aircraft companies are the prime contractors for the great majority, and there is not a single missile for which one of these companies does not have responsibility for one or more of the three elements—airframe, propulsion or guidance. Around $2.6 billion worth of missiles contracts are in the hands of our companies. This,

lead in ideas . . ."

plus the increase in manned aircraft performance, has had enormous effect on company research and development, on plant and facilities and on manufacturing methods. Larger proportions of over-all employment are devoted to research and development (whose costs to the industry rose from $758 million in 1953 to over a billion dollars in 1956, an increase of 25 percent). Our companies employ scientists and engineers from nearly every quarter of technical learning. New plant requirements, new types of machine tools, new processes and new equipment and techniques for test have all added greatly to the burden.

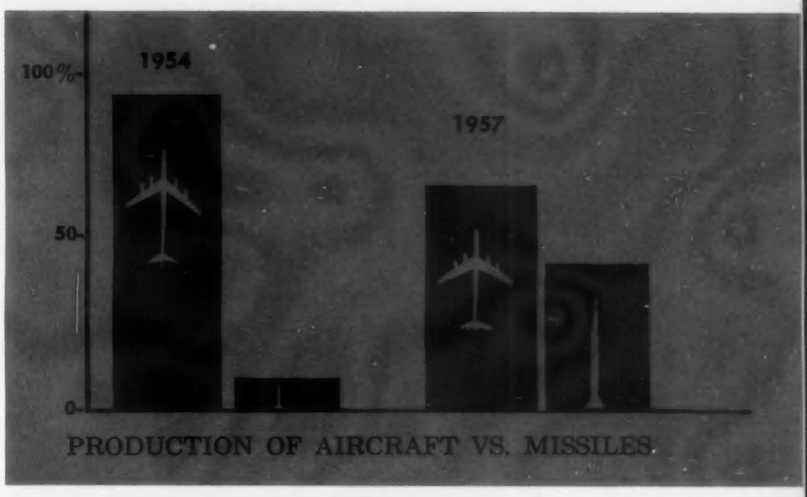
And now, the challenge of leadership in space further compounds the industry's problem, bringing in new breeds of scientists and calling for more adjustments in engineering and technology and manufacture. Where, in World War II, there was one engineer for every eleven workers, a typical aircraft company reports one out of four is a scientist or engineer in aircraft work, and in guided missiles the ratio is one-to-one.

Plans For Manned Space Craft

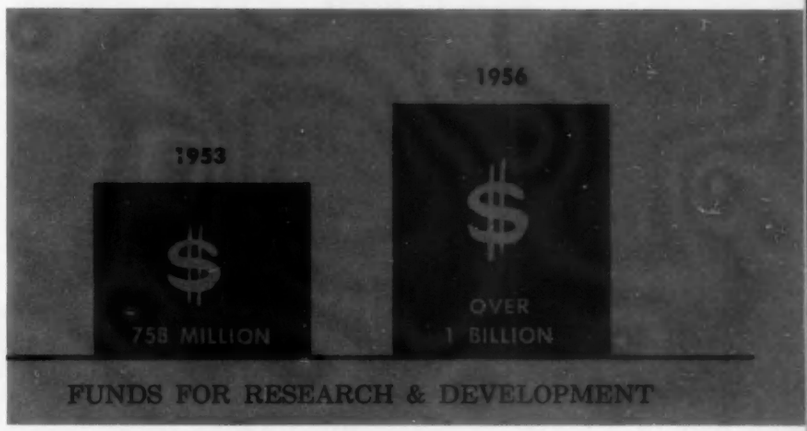
Already, plans are well defined and far advanced for putting men into space. It is possible that we will not get there first, especially when we contemplate the truck-size Sputnik III now in orbit. Next year, the X-15, a manned rocket research plane being built by one of the larger aircraft manufacturers, is expected to reach an altitude of 100 miles in its tests, and it is believed that a version of that craft ultimately will go into orbit around the earth. Other projects also are being worked out for space travel and for space platforms. While our present satellites are relaying much valuable information, we should make our greatest progress in unlocking the secrets of the universe when men can see for themselves. And the future potential of manned space craft armed with missiles cannot be overlooked.

For much the same reason, I cannot help but feel that, having viewed guided missiles in a "miracle" role, we will come full circle again and return the emphasis to manned aircraft. In this I believe I reflect an important school of thought in military, science and industry. There is no denying that missiles are marvelous pieces of equipment, or that they will take over many of the tasks of manned aircraft, particularly in the shorter ranges. But for strategic attack, the value of human judgment, the ability to strike from any direction, the evasion to counter-measures and the capability of a pilot to continue or return, even if complicated equipment malfunctions, are factors which cannot be overlooked. There is little difference in complexity between a guided missile and a modern manned combat aircraft. Some of our late planes have been dubbed "missiles with

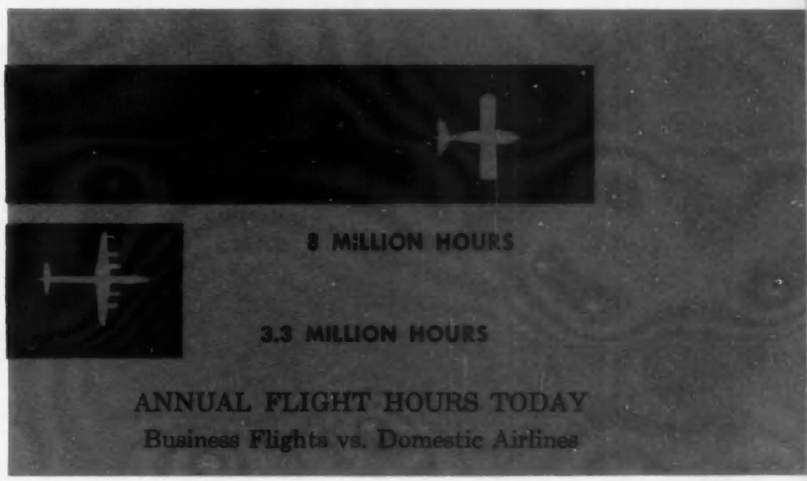
THE CHANGING AIRCRAFT INDUSTRY



PRODUCTION OF AIRCRAFT VS. MISSILES



FUNDS FOR RESEARCH & DEVELOPMENT



ANNUAL FLIGHT HOURS TODAY
Business Flights vs. Domestic Airlines

"I envy the Allies nothing more than their aircraft industry, and its ability thereby

men in them." Give such a "missile" a missile of its own to send far ahead to target, and you have a formidable system.

On the commercial side, there seems to be little probability that the United States will lose its lead in civil aviation. Already, 85 percent of the commercial transports on the free world's airlines are American-built. On order, as of April 30, were 560 jet and turbo-prop aircraft scheduled for delivery to the domestic and foreign airlines, not to mention 99 large piston types to add to the 2,500 now in service. The possibility that Russia, with low cost labor, and with generous subsidies, can make serious inroads in our foreign markets, should not be rejected. We cannot ignore the fact that Russia now has jets in commercial operations.

Air Transportation: A Business Necessity

Air transportation, public and private, long since ceased being a mere convenience. Today it is a necessity for business and government. Modern life is geared to the speed of air movement. It has extended the horizons of the ordinary traveler and it has created a huge new market in world tourism, which is an important economic factor in itself.

Turbine-engine transports will have a revolutionary effect on domestic and world commerce, as well as on military logistics. Coast to coast in four hours, New York to London in six hours and San Francisco to Tokyo in nine hours should stimulate business and social movement beyond estimate. In our modern order, competition is severe, time is money and international affairs are critical. While these vibrationless craft will be far larger and more expensive than the older types, the operators will make up the difference in faster turnarounds and, therefore, more revenue use of equipment, provided they are not hampered badly at the start.

CAB Delay Hurts Airlines

The airlines are having their troubles on the financial side. Profits in the first quarter of 1958 dropped sharply. Their borrowings have increased greatly, resulting from efforts to supply the public with expensive new equipment, the jet and prop-jet aircraft which will so vastly improve air transportation. These, plus higher operating costs and the fact that airline fares are lower today than they were in 1938 and have not increased since 1942, have forced the lines to ask urgently for an increase in passenger fares. Despite the obvious need, their case is floundering through the protracted procedures of the Civil Aeronautics Board. A small interim increase, granted by CAB, has been of little help. Bureaucratic delay in solving this extremely important problem can result in irretrievable losses in airline progress and prestige.

We can find no reasonable excuse for the delays which are causing this distress. Here is an outstanding example of progressive private industry trying its best to serve the public interest. Only private capital is involved. No government subsidy is being sought. Yet, with the jet age of transportation upon us and first deliveries of the new equipment scheduled to begin this year, the airlines are being subjected to ponderous processes on what ultimately is bound to be a favorable decision if we are to maintain our world leadership in commercial aviation.

Business and other private flying, including helicopters, has had a steady climb. Sales are increasing sharply. Today, in general aviation, there are 65,000 planes in the active fleet. These fly an average of 10 million hours annually, or three times the annual hours flown by the domestic airlines. Of this, 80 percent is for business purposes.

Helicopters A Bright Prospect

One of the brightest prospects for largely-increased business is in the helicopter segment of the industry. New turbine-powered craft of commercially-acceptable performance and capacity will be introduced soon, and thereafter the peculiar advantages of these remarkable craft in mid-city and local operations should be realized much more fully. The principal obstacles to early public use of helicopters on a wider scale are antiquated local laws governing air traffic, and the lag in planning and building downtown heliports.

As might be expected in operations of such magnitude as I have described, the industry has many problems. Scientific, technical and administrative problems are myriad—too numerous to mention here. But there are several industry-wide matters which we can discuss briefly.

Because the bulk of our business is with the military services, the knottiest problems arise from this necessarily complicated relationship. Contrasted with our civil aircraft business, or with consumer industry whose changes in product are periodic rather than constant, our military products have been subject to change at any and all times, if the slightest advantage could be realized by such change. This is as it should be. It is something we have always had, and we are geared to handle it.

But today, changes of vastly greater scope and import are taking place. Indeed, the whole character of our business and our operations is changing. No longer can our country rely on the vaunted production capacity of industry to stand as a bulwark between it and an aggressor. We are living in a climate of new ideas. Production leadership we still have, at least at this point in history. But we have learned bitterly that we have no similar lead in ideas. The creative output of a few gifted

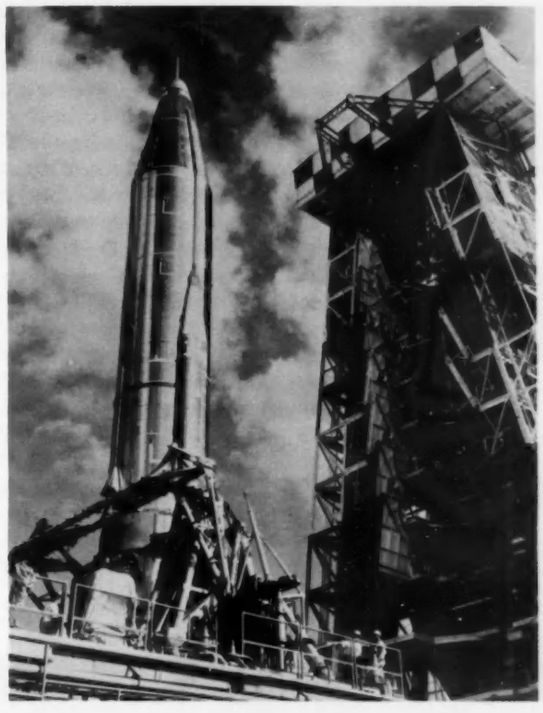
financially independent, private, competitive to develop new models." —Field Marshal HERMANN GOERING

individuals can do more today to guard our national safety than could our astonishing World War II capability of mass producing 96,000 military aircraft in a single year. To a considerable degree, this also applies to increases in our standard of living.

Government Policies Must Encourage Initiative

If we accept this fact, as we surely must, then it seems obvious that we must do everything possible to encourage and stimulate new ideas. Yet, during recent years, certain policies and practices in government seem to stifle, rather than encourage, such initiative.

An example may be cited in the policies governing the collection and distribution of proprietary information. Instead of protecting the inventions of laboratories and engineering departments in industry, procuring agencies take them away and distribute them to other companies, domestic and



Convair Atlas complex at Cape Canaveral, shows vast facilities that support test firings.

Diverse American airpower at Edwards AFB, California, from left: McDonnell F-101, Douglas F4D, Grumman F11F-1F, Boeing B-47, Lockheed F-104A, North American F-86D and (rear) Chance Vought Regulus II.

"There is a critical need for some

(in some cases) foreign, thus setting up unfair competition against the companies producing them. This could hardly be called encouragement to the creative talent of our nation. We need measures which would protect design originators against the pirating of their ideas.

Then there is a stifling effect on the industry of another kind. The primary problem of top management in defense industry today is how to acquire the funds needed to invest in research, development and testing facilities required to perfect the amazing defense weapons of tomorrow. This problem is greatly aggravated by the manner in which the Renegotiation Act has been administered in recent years. This act was designed during World War II to recapture excessive profits which might result from necessarily hasty negotiation of contracts in the heat and urgency of war. It served a worthwhile purpose. But, as presently interpreted and administered, the act repudiates carefully-developed contract clauses which were written by experienced procuring agencies and designed to promote industrial efficiency and reduce costs to the taxpayer.

Vital Contributions Must Be Rewarded

The aircraft industry has always been opposed to truly excessive or unconscionable profits from defense business. But when a company makes a substantial contribution to defense by designing and producing superior products on schedule and at reasonable cost, and when its earnings are within the framework established by contract, a verdict of excessive profits is patently unjustified.

There is a critical need for some changes in the Renegotiation Act in order to assure that its administration will not completely nullify all of the carefully-developed cost reduction techniques agreed upon by the military services and the industry. This change will be in the national interest. Far from permitting unreasonable profits, it will result in overall savings to the government through planned cost reductions—a goal toward which a joint effort of military and industry is constantly being directed.

Thus it can be seen by these glimpses that the

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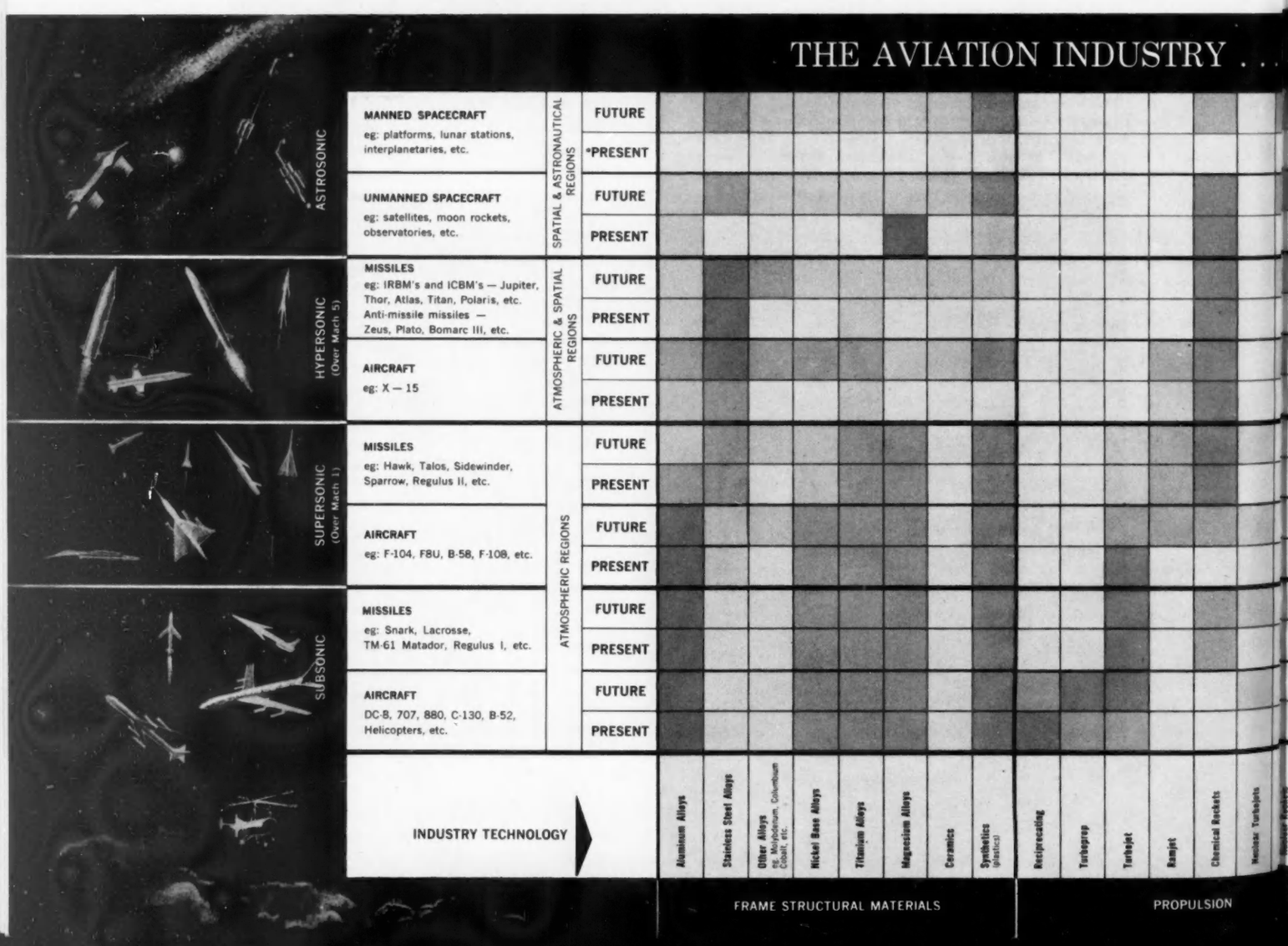


changes in the Renegotiation Act . . ."

aircraft industry's responsibility is both heavy and complex. It must do its part to out-invent, out-develop and out-produce aggressor nations. It is required to finance a greater proportion of its military business than ever before. Therefore, it is assuming greater risks. Adjusting to evolutionary change, it must still be apprehensive of sudden and widespread changes which can disrupt its programs and bring irretrievable losses of time. And, at the same time, it must fulfill its mission of keeping this nation ahead in civil and commercial aviation.

Government Shares Responsibility

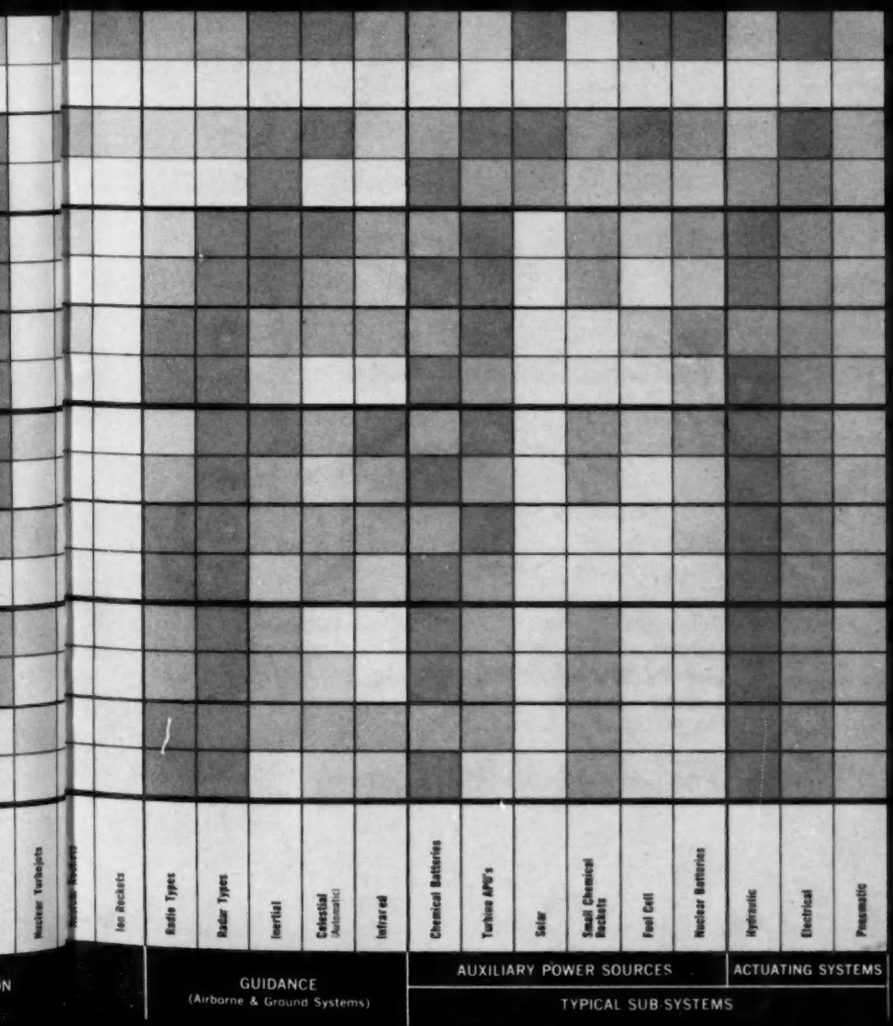
These responsibilities the industry does not fear. But, I repeat, there rests on government, administrative and legislative, the responsibility of seeing to it that this industry is encouraged in every possible way, not discouraged, in its efforts to provide new ideas, new scientific discovery and new technology in the struggle for supremacy in air and space.

One's memory cannot help but go back to the 1930's when Germany, restricted by treaty from building great strength on land or sea, turned to the air. While America and her allies dallied, she forged her mighty Luftwaffe with a nationalized industry. She almost won. Yet there came a day in World War II when Field Marshal Hermann Goering, looking ruefully at his shattered wings, said: "I envy the allies nothing more than their financially independent, private, competitive aircraft industry and its ability thereby to develop new models."

Uneasy Stalemate Cannot Continue

War is swifter today, and many times more terrible. Our safety lies in an uneasy stalemate. This cannot continue. We have superiority in conventional weapons. We must achieve superiority in the newer, more sophisticated systems. Once more our military is looking to free, competitive industry to develop and build the weapons which will give us and our allies that superiority. We believe that, with proper understanding and support, it can be done.

. . . PRESENT AND FUTURE



This chart is a graphic presentation of the Scope of Aviation Industry projects—and their relationship with some of the major areas of technology. It's based on present knowledge, within the limits of security.

CODE:

- Extensive Application
- Definite Application — but not necessarily extensive
- Possible Application — but Extent Not Determinable
- No Known Application

FUTURE = PROJECTS PLANNED OR ANTICIPATED

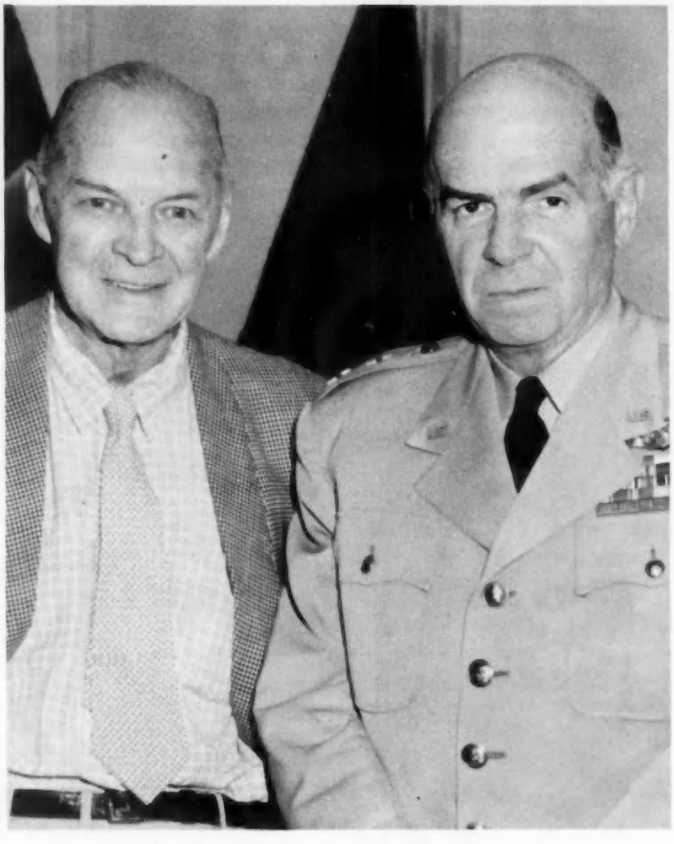
PRESENT = KNOWN VEHICLES IN OPERATION OR DEVELOPMENT 1958

*Little information available since no vehicles at present to analyse.

World War I pilots Gill Robb Wilson (right) and brother, the late Joseph V. Wilson—*France 1917.*

War correspondent Gill Robb Wilson during operations on Crete—*1944.*

Major General Francis H. Griswald with Air Force Consultant Gill Robb Wilson at SAC headquarters —*Omaha, Nebraska 1956.*



Gill Robb Wilson once said, "Whoever dedicates himself to a great ideal himself becomes great." He exemplifies that quote.

Mr. Wilson made his first solo flight shortly after the Wright brothers got their first flying machine off the ground. He has participated in almost every significant phase of aviation since.

Trained as a pilot in France, he flew with Escadrille 66 in World War I, and later with U. S. Second Army Bombardment Group. He covered World War II for the *New York Herald Tribune* as war correspondent and aviation columnist.

Mr. Wilson was chairman of the first Aeronautics Committee of the American Legion, director for 15 years of the New Jersey Department of Aviation. He is editor and publisher of FLYING Magazine, co-founder and director of the Aircraft Owners and Pilots Association, a consultant to the USAF Training Command, a member of the Congressional Aviation Policy Board, a past-President of the Air Force Association, and is now serving as vice-president of the Air Force Historical Foundation.

STATECRAFT IS A DOMESTIC ART

by Gill Robb Wilson, Editor and Publisher, Flying Magazine

Gill Robb Wilson, a man who has dedicated his life to U. S. Airpower, wonders about a transformation in our American way of life. Government, he feels, has complicated its traditional relationship to the people. —EDITOR

Not the cost of government but the fixed charges of politics shake the national economy. Not the business of price but the price of business confounds industry. Not the fact of confiscatory taxes but the manipulation of his private life through taxation frustrates the citizen. And this at a time when the sharpest possible instrument for the preservation of the American heritage is a resurgence of the initiative to enterprise that sponsored our national stature.

Recently we have seen evidences of the deteriorating solidarity of the Western Hemisphere due to pre-occupation of our statescraft elsewhere. I suggest that there is an even more intimate area requiring attention—our domestic scene. I am concerned that Government is highlighted as the most difficult customer of business; that continuation of a spiraling inflation is a matter of political expediency; that such a principle as competition is urged to preserve a decadent defense establishment but not recognized in maintenance of adequate research and development to preserve technological leadership in international affairs.

As one of a group of airmen, I have spent a lifetime toiling consciously to reduce the physical globe to more flexible proportions. The crux of this ambition has been to present the American way of life in an ever larger framework. I am convinced that historic perpetuation of any government or people rests, not with what it or they conserve unendingly to themselves as a standard of life, but what proportion of such a standard is adopted by others. What irony then that with the logistic aspects of our problem overcome, we are confronted with government in a role complicating its traditional relationship to the people—the relationship from which sprung our unparalleled way of life.

Generating Deep-rooted Patriotism

Blessed with great natural resources, abundant labor supply and the incentive of profit through private enterprise, the American people built themselves during the last 80 years an unexcelled industrial complex. Largely from this complex came our prosperity. During the process, the role of federal government was relatively simple—to chart the trail of 'manifest destiny'; to guarantee the integrity of the Union at home and abroad; to maintain constitutional fidelity; to assure opportunity. This role of government was calculated to generate deep rooted patriotism—and it did. "Don't sell America short," the citizen cried; and reinvested his earnings as fast as they became available. Hundreds of thousands of small businesses came into being and many of them quickly grew into large businesses. The people ate well as industry gave agriculture new tools for production —travelled widely on private or corporate cushioned seats—dressed well as markets became available to all. "God Bless America," sang the citizen, pouring out his praise of the Republic. "I pledge allegiance to the flag . . . and to the Republic for which it stands," he solemnly reiterated on every occasion.

This relationship of government and people was the unique glory of American citizenship. This was a thing a man could cherish. This was a thing above all to bequeath to sons and daughters. Thousands of times I have stood recall in the quiet ranks as the flag came down in the dusk and knew why I was an American. Many times I have stood grieving as the rifles barked and the roll of taps consigned comrades to the long sleep—but always have been sure the price was right. When a people lose affection for Government, they stand in jeopardy of losing all. And that is what now concerns me.

Prying At Republic's Foundation

How change came—some of it roaring like a tornado across the area of our times, moving anticlockwise to social progress as a tornado moves in azimuth, is a matter of record. But other change also came. And this was on stealthy feet as egocentrics in power pried at the foundations of the Republic. They wore plumes and played on pipes. Whatever else they were, they were not inept politicians. It is not for lack of aptness but for being inadequate to the preservation of the American heritage that we hold them in judgment. They had the inviolability of the free world in their hands and did not know how to conserve it. When the forces of tyranny were divided into two opposing ideologies, Naziism and Communism, they could have maintained constitutional society inviolate to attack from either or both by creation

"Great governments perish by conquest only when the sense of historicity is gone."

and maintenance of indisputable global air supremacy. But this they refused to credit. Inevitably they found themselves aligned with one devil's ideology against another. The only participants of World War II who could not win, despite who did, were the free people of the world. The culmination of the great war was establishment of the Soviet Union, a self-declared predator of all human freedom, as the entrenched party of the second part in international balance of power.

Government's Role Drastically Changed

So, on top of the vast outlay of the second great war, the American Government, to meet the continuous perfidy of its erstwhile ally, and to satiate the creeping socialism that had been introduced, finds itself so burdened that its role in relationship to the people is changed in revolutionary degree. Now government stands athwart the market place, the big buyer, the big spender, the great regulator with its hand deep in every citizen's pocket and its red tape so intricately wound about the muscles of the nation's enterprise that its decisions in defense contracts alone are prime sources of employment or unemployment. And as far as the service of partisan organization is concerned—the standards of political concepts are so intellectually threadbare that they deny the citizen any choice of ideas or ideals bearing on the character of his government. The ultimate end of this denial is to disfranchise the citizen from any historic interest in government beyond some mere intrinsic of personal security. So the groundwork for our present situation was laid.

During the rise of Adolph Hitler, with some friends in the Luftwaffe, I went down from Berlin to attend the National Soaring Championships at the Wasserkuppe and by chance made acquaintance with a Bavarian cattleman. He was a fine type and I was surprised in visiting his home at a later date to see standing on the mantle a certificate of membership in the Nazi Party.

He noticed my attention to the certificate and said, "You are wondering about that."

"Yes," I said, "I am."

"It is very simple," he vouched. "I am a cattle grower as were my father and grandfather before me. For many years we have been the victims of a beef cartel which came annually from Berlin to buy at fixed prices regardless of our production costs or exceptional quality. This injustice the Nazi officials promised to eradicate if we would join the Party. We joined and now we bargain freely on an open market for our beef."

A New Yardstick: The Price Of Beef

I could have told him that he had sold his heritage for a mess of pottage. But the bargain had been made. The price of beef had become his yardstick of government. Somewhere back along the road lay a broken appreciation of the vitality of relationship between a citizen and his government. Like the scuffed bark of a tree, it had opened the way for the borer—and there are always borers.

So today, I find myself troubled not so much by the nature of foreign opposition, as by the apparent indifference of government to what the rank and file of the vast unorganized millions of us think of it. This in contrast to the catering to minority blocks which deliver political favor at the polls—in reward for "the price of beef." As a simple citizen, I cringe as young men ask me to help them locate with firms "that have no government contracts, so that if I develop ideas they will not be confiscated."

Survival Takes Precedence

No thoughtful citizen can be unaware of the complexity and magnitude of the task of government; or that the matter of survival must have precedence over the uninterrupted pursuit of the more abundant life. Yet government, knowing this, compromises with the fact—has less rather than more conscience than is demanded by the extremity of the times.

And, if it seems strange to the reader that I write in a Corporate publication of such matters, let it be understood that I consider the complexity of doing business with government as but one phase of a broader pattern of irritation that sets government over against its citizenry except for segments which have bargaining power in the political market. This, I think, deteriorates that mutual confidence which must exist between the governor and the governed. This is the universal pattern down which all empire has gone to oblivion. Great governments perish by conquest only when the sense of historicity is gone. Statecraft is a domestic art.

Defense Round-up

The Air Force's three top Materiel executives probe new concepts of management; discuss how they are being applied to programs; reveal the results being achieved; and suggest parallel measures in industry to advance the military-industry team effort.

New Demands for More Effective Defense Management

BY DUDLEY C. SHARP,
Assistant Secretary of the Air Force for Materiel

Among Mr. Sharp's responsibilities as Assistant Secretary of the Air Force for Materiel: procurement, production, storage, renegotiation affairs and contract appeals.

After graduation from Princeton in 1928, Mr. Sharp returned to his home in Houston, Texas, where he joined the Mission Manufacturing Co. In 1946—following a tour of duty with the U. S. Navy—he became president of that company. He held this position until sworn into his present office in October, 1955.

The defense business is being squeezed hard on two sides.

On the one hand, there is the urgent life-or-death demand that the military/industry team deliver enough weapons of sufficiently superior quality and in adequate time to deter aggression —regardless of cost.

On the other hand, there is an equally severe demand that we so conserve our three critical resources—money, men and materials—that we can preserve the basic strength of the economy . . . even though in so doing we may not be able to buy all the defense we may feel we need.

The fact is: the nation must have both . . . and those who manage the myriad operations of the military/defense team share a critical responsibility and opportunity in helping the nation to realize both.

Atmosphere Of Healthy Cooperation

Let us recognize that defense is in a state of transition which creates new problems. Their solution requires an atmosphere of healthy cooperation. If such an atmosphere did not exist, we could not discuss these problems with the objectivity they demand.

This transitional period may well result in new Air Force organizational concepts and structure; in a realignment of the operation commands; in a modification of the research, development, and logistics structures; and possibly in a different set-up within our Headquarters.

The impact of these transitions on industry is severe in many ways. Long-run production programs are being drastically curtailed; short runs are becoming the norm. Rapid technological changes are virtually obsoleting whole systems before they are built. Variations in the international climate may, and do, bring sudden program changes.

Change has almost become the rule. Let us not resist it. Not change for the sake of change, but change to keep the United States ahead of the Soviet's rapid rate of progress.

Toward More Defense Per Tax Dollar

Time, dollars and talent must be engineered into those relatively few programs which promise the greatest pay-off in superior defense at the least cost. As summarized by Representative George H. Mahon, of Texas, Chairman of the Subcommittee for Defense Department appropriations, "It should be clear that spending money for spending's sake in order to employ people in

the defense program is not advocated and could not be defended. *All will agree that it would not be in keeping with the traditions of our country to spend money to build weapons and facilities which are not urgently needed for defense just to bolster up a sagging economy."*

The first point in the Air Force's philosophy of procurement is that our principal purpose for being is the defense of the United States.

The second point is that competition and the profit motive are basic to the American system of business; we must take full advantage of these.

The Air Force will give industry as much assistance as possible in pointing the way to the future. In following articles in this magazine, Generals Irvine and Rawlings will describe highlights of some of our programs and guidelines on how corporate management can tie in with them most effectively. But for self-preservation, manufacturers must use their own initiative if they expect to be truly competitive—and prosperous—in the years to come.

Preserving Competitive Free Enterprise

The Air Force is letting about a million contracts a year. In administering them, we must realize the maximum amount of defense hardware per defense dollar. But we do not intend to disrupt competitive free enterprise in the process. To do so would be to destroy one of the basic institutions we are struggling to preserve, and we intend to do all we can to further this system as being the best means of achieving our defense goals.

In attacking its share of the problems during this severe transitional period, the Air Force must answer the pressing questions regarding the best ratio of aircraft to missiles for adequate defense; the best development program for long-range war deterrent power; and the best organizational structure for operating the Air Force weapon systems on hand and procuring superior ones for the future.

For its part, industry must keep pace with current technology; project itself into the immediate future so that production of high performance weapon systems can continue unabated; and press toward early solution of the hardware problems related to space operations.

Experience Our Springboard

Together, we must project our current level of cooperation into the years ahead. Using experience as a springboard, we should be able to assure this nation a defense establishment that will become progressively stronger as we push through the aircraft/missile/space era. Through dynamic and efficient management, we must create this superior defense with a minimum investment of our natural resources, thereby preserving the firm economic foundation upon which the defense effort must rest.

I know we can—for we have no other choice.

Managing Air-Space Programs

BY LT. GENERAL C. S. IRVINE,
Deputy Chief of Staff, Materiel, Headquarters, U. S. Air Force

During his 32 years of service with the nation's air arm, General Irvine has accumulated an impressive array of decorations. Among them: the Distinguished Service Medal, Silver Star, Legion Of Merit, Distinguished Flying Cross, Bronze Star and Air Medal. In 1946, he piloted the "Pacusan Dreamboat" — an AAF B-29 with a crew of 10—on an unprecedented nonstop flight from Honolulu to Cairo in 39 hours and 36 minutes.

General Irvine was assigned to his present position, USAF Deputy Chief of Staff For Materiel, in May, 1955.

The challenge to Air Force-industry management is clear: to achieve as much progress in the next five years as has been realized in the past fifty.

Better management has always been a worthwhile purpose—something to work toward.

Today it is absolutely essential. For now, and for the years ahead, we will have to expend large sums of our national income to maintain the world's best deterrent force. *Better management must prevail*—at all levels of government and industry—if we are to have this force without disrupting our entire economic structure.

The demand is for integrated management to handle such complex development and production programs as:

1. aircraft, missiles and support equipment with performance characteristics from 50% to 100% greater than current systems offer;
2. advanced piloted bombers and interceptors in the Mach 3-plus category, with altitudes above 75,000 feet;
3. fire control systems with lock-on capabilities in excess of 50 miles;

4. ballistic missiles more accurate, more self sufficient than current copies;

5. air defense weapon systems that can reach out farther; move faster with their time-for-launch sharply reduced; and with a kill accuracy virtually 100%.

Planning For The Day After Tomorrow

We are definitely in an era of transition, as Secretary Sharp has already pointed out in an earlier message. And for the day after tomorrow, weapon system requirements will become even more severe. It is imperative that we work *now* toward unmanned reconnaissance satellites; toward piloted space vehicles with weapon deployment capabilities; and toward defense system complexes far superior to anything now envisioned.

For the future, it is entirely possible that nuclear warheads of today will be totally obsolete. Devices such as controlled elliptical mirrors, infra-red, and photon devices may be developed in conjunction with the space vehicles, themselves. It is also possible that fantastic new electronic devices, employing a technical follow-on to radar, will enable our forces to neutralize or paralyze an aggressor force *without loss of life or destruction of property.*

America has progressed by following the positive approach to all challenges. It will continue to grow and prosper only if it continues to adhere to this philosophy.

Strong Competition For Defense Business

What does it take to win in this management-technological race?

The impact of progressively changing weapon system requirements virtually demands a more realistic managerial approach. To obtain a portion of this procurement business, which will probably remain in the neighborhood of seven billion dollars a year over the next several years for new hardware, individual companies will face very strong competition. And since the technical competence of one will about parallel that of the others, deciding factors may well be management initiative, and control of overhead costs.

From industry's viewpoint, the task of company management is, of course, to obtain business, reduce overhead, and make money for the owners and stockholders.

From the Air Force viewpoint, better management means that we obtain reliable hardware, on schedule, and at reasonable price.

These viewpoints are not incompatible.

Emphasis on quality will be more stringent in the future than ever before in the history of weapon system production. Industries that meet this challenge, those that produce truly reliable hardware—those, in other words, that demonstrate ingenuity and a truly competitive spirit—should prosper in the years ahead.

Defense Is Everybody's Job

On the subject of company initiative—I should like to underscore one major point. Defense is everybody's job, not just the government's. This is the price and privilege of democracy. Our great corporations, large and small, should have the opportunity and responsibility to share in the providing of national defense. I refer specifically to their assuming initiative in investing their own resources in research and development.

Some of our companies have been moving in this direction for a number of years, and I have no doubt that they will be joined by many others. By rolling up their sleeves and pitching hard to advance government-sponsored projects, they are literally putting the full force of the free enterprise effort behind military scientific progress.

Such private investments are evidence of both good patriotism and good business. At a time when competition is getting stiffer by the month, the company that has contributed to the technical development of an idea is in a better bargaining position. In reality, this is just another way of saying you have to spend money to make money. Our military forces must stay ahead. Therefore, if any manufacturer comes up with a significantly better piece of equipment, we have no choice but to buy it. This is just plain sound management.

Good Business To Survive

I have no doubt that the sum total contributions of the air/space management team—in the military, in industry, in universities and other private institutions—will impel the nation into a position of defense superiority and national security. It is good business to survive, and we are all partners in that business.

Dynamic Management For Logistical Support

BY GENERAL E. W. RAWLINGS,
Commander, USAF Air Materiel Command

Considered an outstanding business management expert in the military, General Rawlings has headed the Air Materiel Command since 1951.

He is noted for his pre-dawn take-offs on flying inspection trips of AMC's world-wide logistics facilities. In the plane, General Rawlings often takes the controls himself, always ploughs through stacks of paper work accumulated for "trip handling." On a recent highly compressed tour of European and African depots, a weakening aide remarked, "If I could just find out when he *does* sleep, maybe I could get some myself."

General Rawlings holds a master's degree in Industrial Management from Harvard's Graduate School of Business Administration plus five honorary degrees.

Mixed forces of manned and unmanned weapon systems have intensified USAF's drive for steadily improved management of the whole logistical support system. In the Air Materiel Command, USAF's logistics arm, we are focusing our energies on this objective.

First, we are increasing application and refinement of the weapon system concept. Missiles, with their complex ground support equipment, have emphasized the need for vertical alignment of management functions by total weapon system. The THOR intermediate ballistic missile—flight-tested less than a year after the signing of the original letter contract, and scheduled for deployment overseas by the end of this year—is an outstanding example of the success of this approach. While the THOR was still in development, preparations were made for ground equipment, details of logistical support were planned and personnel trained to handle the missile. Result: the missile could be quickly speeded into USAF's active inventory.

Management By Weapon System

In addition to the Directorate of Ballistic Missiles, AMC now has 19 weapon system offices. Each is charged with closely integrated logistical support of individual weapon systems, or families of weapon systems. Management by weapon system unquestionably poses problems of industrial adjustment, and demands careful cross-monitoring to prevent duplication of effort. But its advantages in delivering working weapon systems in minimum time make it a guiding principle of the future.

Secondly, we are sharpening the tools and methods of management throughout the logistical system. To provide effective support with more limited total inventories, we are making increased use of electronic data processing equipment, high speed communications, and air-lift for high-value materiel. Comparison of initial spares expenditures for the F-89 and F-101 indicate results already being achieved. Average spares cost for one F-89 aircraft was $108,100, compared to $98,600 for one F-101—about a 10% reduction per plane for support of a newer, more complex weapon system whose original cost is 1½ times that of the earlier F-89. Since 1952, percentage of total aircraft program allocated to spares has been reduced from 42.5% to 23.5%.

New Control Center Links Missile Team

One example of management tools which make this possible is the electronic control center of the Directorate of Ballistic Missiles at San Bernardino, California. Scheduled for full operation this summer, the center's IBM 705 computer system is connected—by a high speed communications network—directly to missile contractors, supporting bases and operating squadrons. The center will keep track of some 100,000 components per missile, from the moment they are ordered from contractors until they are installed at widely scattered launching sites. It will aid in the rapid, precise solution of management problems in areas of supply, maintenance, transportation and quality control.

These and other new tools and methods have made feasible our third broad approach to improved management: the tightening and streamlining of both the organization and physical plant of the logistics system. Development

of techniques for fast, direct support of combat units anywhere in the world is permitting us to constrict the system geographically. On 1 July, two major overseas depots—at Nouasseur, North Africa, and Burtonwood, England—will be phased out. In the Zone of Interior, five supply depots are undergoing a carefully timed phase-out—to be completed in 1962. These depots now manage 230,000 inventory items—some 20% of the Air Force total—which will gradually be consolidated with the workload of remaining facilities. This constriction cuts total plant overhead costs, and contributes to the concentrated speed of our support response.

We are also merging accounting and finance functions to improve program management. By the end of June, 1958, contract administration, appropriation accounting, disbursing and reporting will have been physically drawn in and relocated at existing Air Procurement District offices and offices of Air Force Plant Representatives.

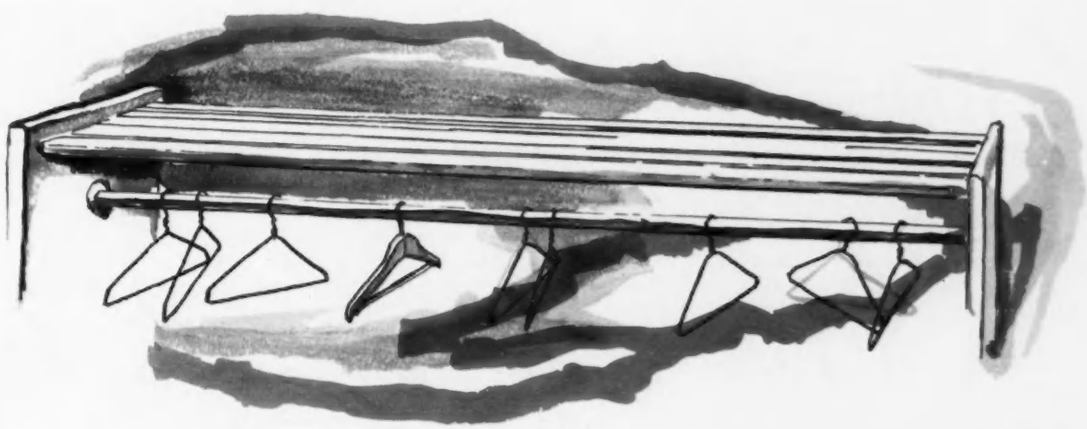
Logistics Is USAF-Industry Partnership

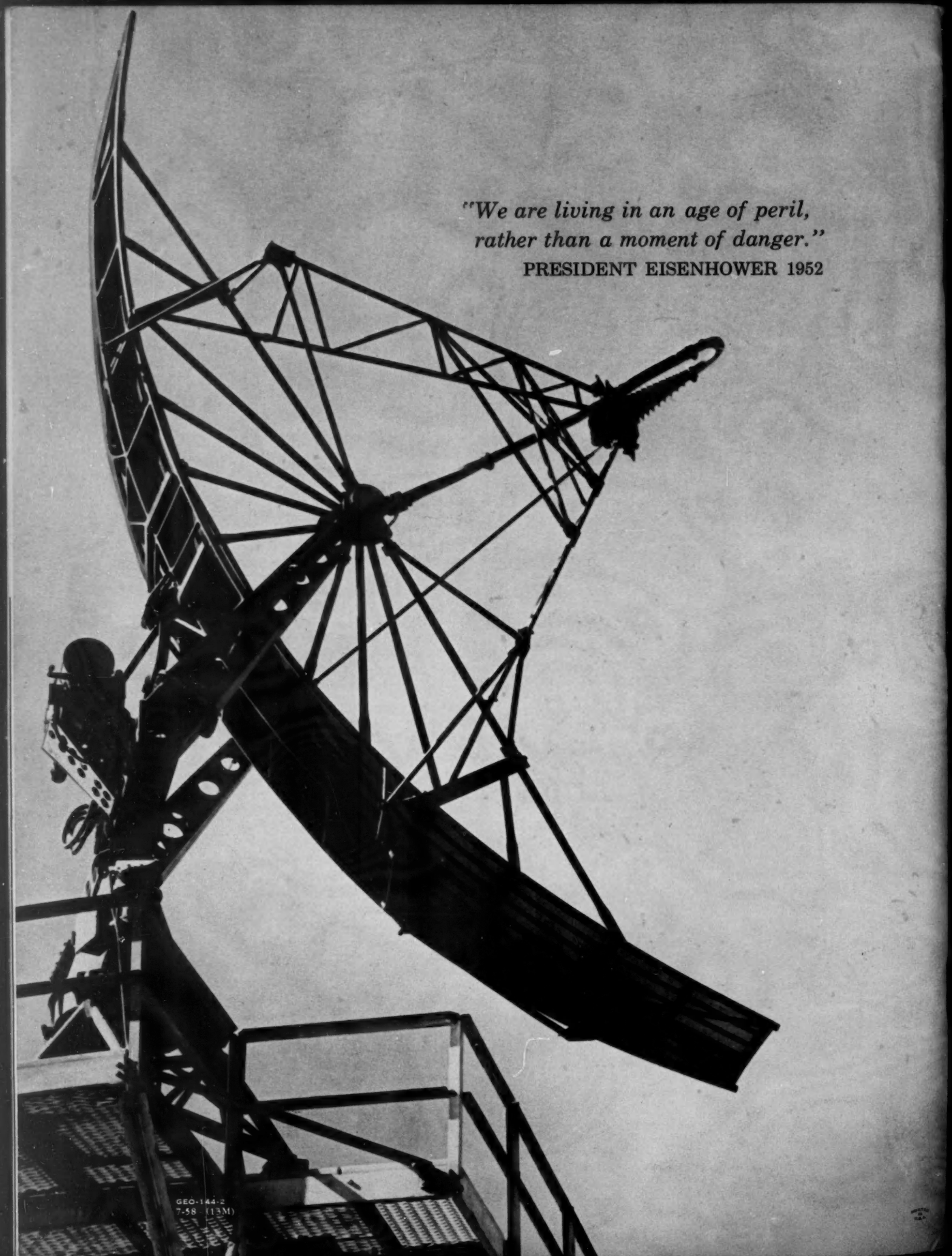
These are some of the major Command efforts toward improved logistical management. Air logistics is, however, in the deepest sense, a partnership between industry and the Air Force. Only the joint efforts of both partners can insure the American people the fullest value for their defense dollars. Industry, too, must consistently work toward increased management effectiveness. It must cut overhead and administrative costs to conform to current defense realities, recast its facilities to the shape of today's weapons and strategic necessities.

We are working to provide sound practical incentive for this in our contracts with industry. The trend, insofar as possible, is toward the fixed-price contract, with incentives for superior performance . . . and penalties for substandard performance, which must be laid directly at the door of poor management. Regardless of the individual contract, however, in the stiffening competition to provide more limited inventories of an extremely high order of reliability, the quality of industrial management must inexorably in the long run separate those who can and who cannot make the grade.

Critical Test Of Management Vision

Both industry and the Air Force face a critical test of the adaptability, resilience and creative forward vision of our management. Whatever our individual approaches to the problem, let us, as defense partners, be certain of one thing—that each step brings us closer to maximum effective utilization of our nation's defense resources.




"We are living in an age of peril,
rather than a moment of danger."
PRESIDENT EISENHOWER 1952
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